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TRANSACTIONS

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MEDICAL AND CHIRURGICAL

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Blank Schemes for taking Cases according to Dr. Fordyce's Plan, similar to the two Sheets at p. 289, may be had at Mr. JOHNSON's, St. Paul's Church-yard. Price 1 s.

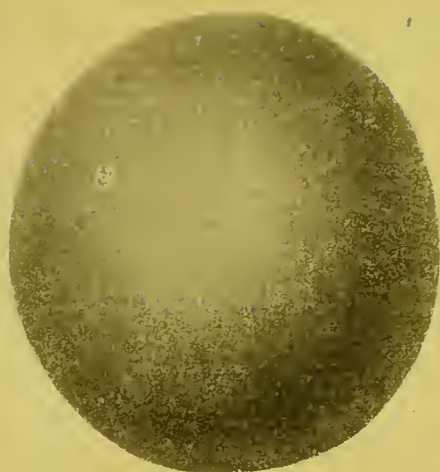


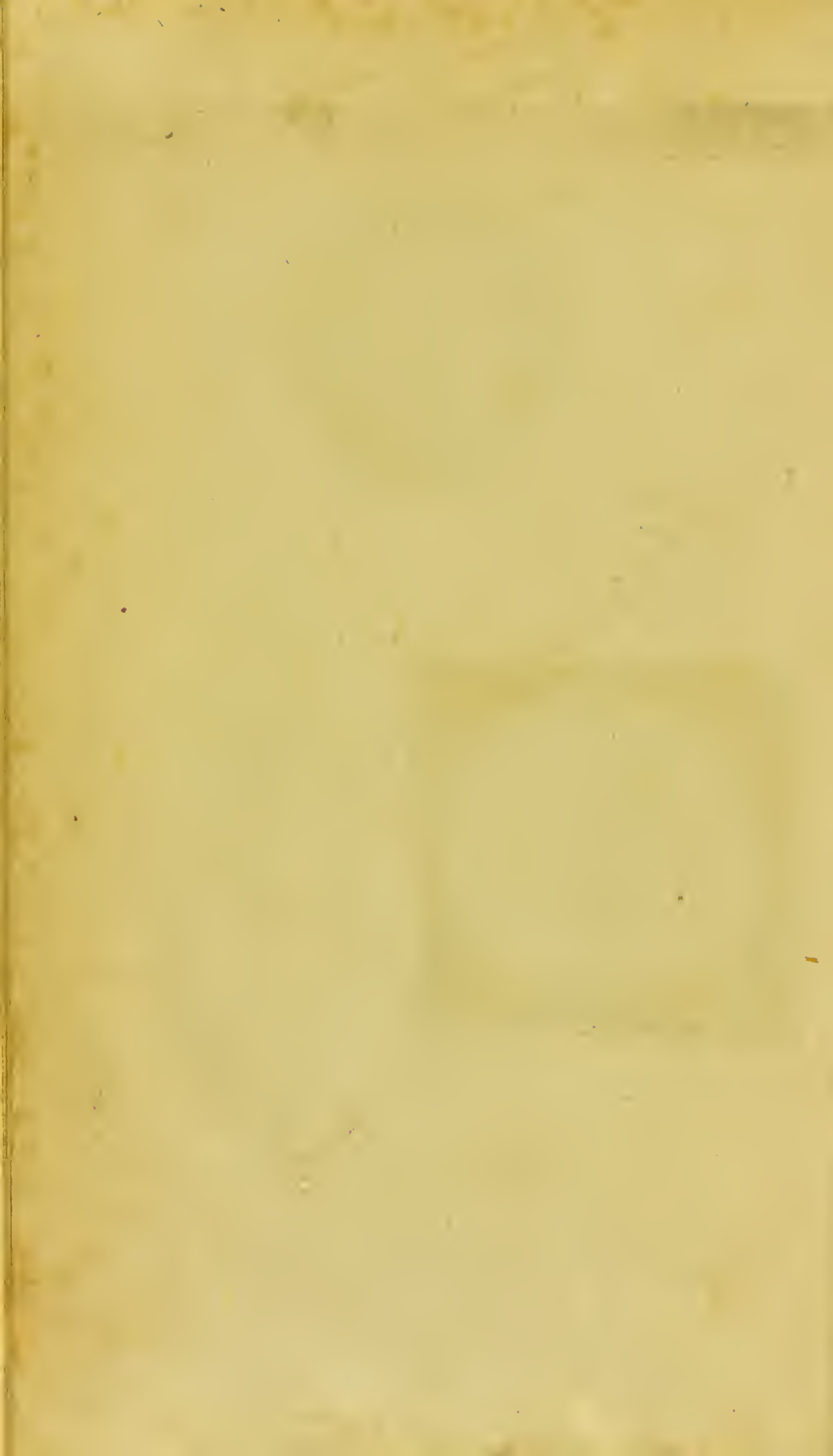
Fig. 1.



Fig. 2.



Fig. 3.



TRANSACTIONS, &c.

I. *Observations on the Small-Pox, and the Causes of Fever.* By GEORGE FORDYCE, M. D. F. R. S. Senior Physician to St. Thomas's Hospital, and Fellow of the Royal College of Physicians in London. Read December 5, 1783.

NINE years ago *, I inoculated a family consisting of three young ladies, for the small-pox. It was my custom, at that time, to make three small punctures in one arm. It happened in the eldest, that the suppuration in one of these, came much forwarder than in the other two: it was perfect on the seventh day, and the fever took place. I expected a great increase of the fever, which was already considerable, when the other two punctures should perfect their

* This paper was printed in the year 1778, but not published.

suppuration, and was not a little alarmed for the safety of my patient: but was greatly surprized to find, when the first of these perfected its suppuration on the beginning of the eighth day, that it produced no effect whatever on the fever; neither did the second, which perfected its suppuration on the end of the eighth.

The reason of making more than one puncture, was to ensure the disease's taking place, as it was supposed that a second inoculation could not be made with safety, till it should be certainly known that the first had not taken place, which is not till eight or ten days in many cases, a time of dreadful anxiety to parents. I conceived now that this opinion was erroneous, and accordingly made no more than one puncture after that time.

It was not till the year after, that a case happened, in which I was in any doubt of the taking of the first puncture; and that was in a young gentleman, in his seventh year. On the third day after the first puncture, I made a second. They both came forward. The fever was produced by the suppuration of the first, was very slight, and when the second suppurated, was not at all

9

increased;

increased ; and there were not twenty pustules in all.

It happened in about a month afterwards, that I was employed to inoculate a boy of four years. His parents sent him a little way into the country, supposing he would be safer in a purer air. In visiting him, the day after the eruption had appeared, I found a child of the woman who kept the house playing with my patient. I asked the mother if he had had the small-pox ; was told No, but that he was preparing for inoculation, which was to be performed in two or three days. It occurred to me, if the natural infection had taken place, that it might be prevented by immediate inoculation, as I had grounds to believe, that it was generally from twelve to fourteen days after receiving the infection, that the natural small-pox took place. It was impossible to meet the other practitioner till the next day. I therefore persuaded the mother to let me inoculate the child immediately ; she insisting, however, that I should not mention it ; which, as I conceived the life of the boy was at stake, and there was no pecuniary consideration, I consented to. Three days after, the child was inoculated a

second time ; my puncture being so slight, as not to be perceived. It inflamed however ; the suppuration was perfected on the eighth day, the fever took place, and the eruption was beginning. The wound made afterwards, suppurated ; but no new fever arose, and the patient had about fifty pustules.

I have now so often repeated this practice, that I have no doubt, but that variolous matter has lost all its power of producing fever, after the first twenty-four hours, from the time it is carried into the blood vessels. I wished, however, to try the effect of inoculation upon a person who had gone through the disease, and accordingly inoculated myself on the back of the hand, by a slight puncture. It inflamed in the usual way, and a pustule arose ; so that I was under some apprehension of having the disease, especially as I had already had two eruptive diseases, which my physicians believed at the time were the small-pox, insomuch, as after the first, no care was taken to avoid exposing me to the infection. I should believe, that they were mistaken in the first. On the fifth day, when the pustule had arisen to the size of the head of a large pin, it was hard, and without

out any matter, and gradually went away without suppuration. I have inoculated myself several times since. Sometimes the same kind of pustule has taken place, and sometimes there has been no inflammation at all.

Dr. Rutherford, my learned master, in his lectures on the practice of physic, to ascertain the time the natural infection of the small-pox is latent, before it produces the fever, mentioned the case of a party of soldiers marching through a village where the disease was, that they were seized from twelve to fourteen days afterwards with the fever, and that this was the usual time. I have seen many cases since, which confirm this opinion, although it also happens, that the infection sometimes takes place sooner. I therefore thought, that, if inoculation rendered the system callous, if I may so speak, to variolous matter, instead of there being any danger in inoculating a patient who had already caught the disease, as the infection was quicker in its action, the inoculation had a great chance of preventing any mischief, by producing the inoculated instead of the natural disease. And this explained a circumstance, which had before surprized

and astonished me, viz. the fool-hardiness of certain empirics, who brought a person to be inoculated into the room of a patient, when the small-pox were at the height, as in many instances he must catch the natural small-pox at the same time; but the inoculation coming before the natural kind, prevented the mischief. It is nevertheless a dangerous practice; for, if the inoculation should not take place, and the patient be infected, there is all the risk of the natural small-pox.

Since the time of my forming these opinions, I have known many instances which confirm them; so that I have no doubt in recommending it to any person, who may chance to have been exposed to the natural infection, to be inoculated immediately.

To ascertain the cause of the small-pox being more or less numerous, has been a matter much wished for. In the family I have already mentioned, the lady in whom one puncture supplicated before the others, and alone operated in producing the disease, the small-pox were much more favourable than in the other two, where all the punctures supplicated together. This led me to reflect

reflect on the case of a girl of five years of age, whom I had inoculated about a month before. The mother of this child was exceedingly anxious, would hold the child herself, and started in such manner, that the two first punctures hardly drew blood, and I was induced to make three more; five in all. This child had the disease very feverishly, which I considered at that time as accidental only, but now began to think, that the quantity of matter absorbed, and acting so as first to produce the fever, was the circumstance which rendered the disease more or less favourable. I therefore resolved to try a very small puncture for the future, which has succeeded so well, that although I have inoculated a great number since that time, I have not met with one case in the smallest degree unfavourable; whereas, when I made a wound as I did at first, and applied the matter on a pledget, the disease was often unfavourable, and the wound very troublesome, which made me change my method to making punctures, of which I made three, rather deep ones, and still I met with many unfavourable cases, so as always to inoculate with terror. I apprehend then, that the

principal, if not the only consideration in inoculation, is the manner of making the puncture, which should be done as follows. Run a lancet into a pustule, either at the time of suppuration, or before, so as it be moistened with the matter; let it dry; moisten it a second time; let it dry; view the point with a magnifier; if it be covered to the very point, it is properly armed; if it be not, it must be dipped in the matter again, until the point is covered compleatly; just before the puncture is to be made, dip the point in water for a second; let it lie for a minute or two, till the matter be softened again; lay bare the arm, and about the insertion of the deltoid muscle make a puncture, penetrating the scarf skin, so that it may be felt on raising the point of the lancet: if no blood appears, the better. Or if you have fresh matter in a quill, dip the point of the lancet in it, so that the point be perfectly covered, and proceed to make the puncture as before. Or if you have dry matter in a quill, moisten it with a very small quantity of water, so as to bring it to the consistence of recent matter, and then proceed as before directed. It is not necessary to apply any thing to the arm; after

after three days examine the arm ; if there be no redness, make another puncture about an inch distance : this, however, will very rarely be found necessary.

Thus, I flatter myself, I have found what is most essential in inoculation. Preparation, it is true, has been supposed to be of great consequence : but I believe this opinion is only a taint of that superstition, which originated with medicine, from the first practitioners, in the less cultivated state of mankind, being priests and conjurers, as well as physicians ; and I am afraid we shall never be able to get clear of this taint, which is the foundation of quackery. Preparation is a great instrument of superstition. A man is prepared to die, by rubbing a little oil on his breast ; turning a chair three times round, is an excellent preparation for playing at whist : so eating soup for a month, renders the body perfectly prepared for mercury.

Taking the matter of preparation seriously, the proposition is, to put the body into a state, in which matter of the small-pox shall produce less fever, fewer pustules, or so that the pustules shall have less effect on the system. Now unless this state be known, how shall we know in what manner it is to
 5 be

be produced? Will any one say, that he knows, on producing a person to him, who is to be affected with the small-pox, whether he will have them favourably, or not? Certainly he cannot, on any principle hitherto known. I have had opportunities frequently, in St. Thomas's Hospital, of seeing persons using mercurial, antimonial, and other regimens, recommended as preparations, seized with the small-pox, which were in no ways more favourable, than in those who were not using any of these remedies. The only thing that seems to have been of any advantage, is living for a little time on vegetable food; and this is even doubtful. I have the greatest reason to believe, that it is not of the smallest consequence, whether the matter be of the mild or confluent kind. I never knew of an instance of any other disease being communicated by inoculation of the small-pox.

There is therefore only one other circumstance, excepting the puncture, to be attended to; which is, that, of the children who have died in London of inoculation for many years, as far as I have been able to collect, more than two thirds have been under nine months; and therefore I have considered

dered it as improper to inoculate before teething. It happened to me, that a family came from America, whose children had not had the small-pox. One of these was under nine months, and on the breast. They applied to me. I refused to inoculate this child, and advised that it should be kept out of the way while the others were inoculated; but rather than submit to this inconvenience, they applied to another practitioner, who inoculated the whole, and this child died.

Since fresh variolous matter has no effect on the fever in the small-pox, it follows, that that which is already in the blood-vessels has also no further effect, after the disease is perfectly brought on; and as other fevers are so exactly similar to that of the small-pox, that it is impossible to distinguish them till the eruption takes place, it is very probable, that other infections, as well as the variolous, only act for a short time in producing the fever, and that They also have no further effect. That this is the case, we have greater reason to believe, from this observation, that patients who have caught infectious fevers in St. Thomas's, and other Hospitals, and continued there, have gone through the disease
in

in a ward where the infection was strong, with as mild symptoms, as where peculiar care has been taken to keep the air as pure as possible. And in general many more people recover of fevers in our Hospitals than in private families, with similar practice; owing most probably to the directions of the practitioners being more strictly attended to; for such is the disposition of mankind to quackery, that you can hardly ever prevent, even a fond mother, from trying experiments on her only son, lying ill of a dangerous disease.

Moreover, if a crisis should take place in the middle of an infectious fever, it happens when the infection is strongest, and its effects therefore the most powerful, if it acts at all on the patient.

Again, those who have once gone through the fever, are less subject to the infection, than those who have not had the disease. This has been long remarked in the plague. I have observed it in our Hospital, in which there are almost always violent fevers, and therefore infectious ones; for all fevers, from whatever cause they arise, I have observed, generate infectious vapour, and commonly according to their violence. Another strong
instance

instance is, that some of the felons, who have brought infection into a court of justice, so as to destroy almost half the court, have had no fever at the time. In the last case which happened at the Old Bailey, the felon was not at the time affected with fever, or any other disease.

From all these circumstances we may conclude, that during the course of a fever, which arose from infection, the infectious matter has nothing to do with the fever, neither increasing, nor diminishing, nor any ways altering it; and that therefore it is not necessary to pay any attention to it in the cure of the disease.

It is worth while enquiring, how far other causes of fever have effect upon it, after it has once taken place. Exposure to cold or moisture, or to anxiety, are two other causes which I have known produce fever. I have seen several cases, in which these have undoubtedly brought on the disease, which has arisen immediately on their application. Where the anxiety is gone off, the fever has nevertheless continued; and when the patient has been brought into a warm and dry air, the fever has continued, and gone through
its

its natural course ; so that it is only necessary, that these causes of fever should be once applied, so as to make an impression. The disease being once produced, goes on of itself ; nevertheless, both anxiety, and cold or moisture, have an effect in keeping up fever. When intermittents cannot be cured in fenny countries, they give way easily on the patient's coming into dry air ; as I have observed in patients brought from Lincolnshire to the Hospital, who have been easily cured, although the same remedies have been used before without success. And I have, in several instances, seen continued fevers spun out to four, five, six weeks, in consequence of distress of the mind.

Why violent fevers should have been called putrid ones, is very difficult to guess, as frequently we find them pass through their course without any sign of putrefaction. There are no purple spots or marbling, no looseness of the gums, no blackness of the tongue, no hemorrhage, no fetor in the excretions except the fæces, no fetor in the breath, no frothiness in the urine, in a great many of them when they are highly infectious ; so that infectious vapour is a matter
totally

totally different from the vapour which arises from putrid substances, which, however, is also certainly a cause of fever; and which has been supposed to act by being introduced into the blood-vessels, and producing putrefaction of the fluids. Now it may be questioned, whether putrid vapour does not also act *uno ictu*, in the same manner as the causes we have already enumerated. That it does not act by inducing putrefaction of the fluids is rendered probable, in as much as this state of them in a fever depends evidently on the depression of strength; and may accordingly be foreseen. If at once the muscular strength be greatly depressed; if there be great sense of weight about the pæcordia, with sighing; if there be great stupidity in the eye, and want of attention and general distress of the mind; we may expect symptoms of putrefaction to appear, whatever might be the cause of the fever.

Moreover, these symptoms of putrefaction when they appear are always the consequence of the fever; for it is several days after the fever takes place, before they make their appearance.

Again, I have known them go off entirely when a phlegmon has arisen, and the fever still

still continued. This happened in two cases. In less than twelve hours, the pulse became hard and strong, instead of having that languor with which it beat before. And sometimes in fevers arising from putrid vapour, no appearance of putrefaction takes place, and the fluids do not become putrid more readily in these with the same depression of strength, than in others; and the progress of the fever is seldom different in consequence of these symptoms of putrefaction; so that I suspect that a fever brought on by putrid vapour, is also independent of its cause, and would go on, when once produced, if there were no longer the least particle of putrid matter in the body.

Food of difficult digestion, I have also known evidently produce a fever, and very often occasion relapses of fevers. These fevers go on when the *primæ viæ* have been cleared of all offending matter, and therefore are independent of their cause. All fevers, however, are much increased by improper food, from whatever cause they arise.

Upon the whole, therefore, it would appear, that a fever produced from any of the known causes goes on, notwithstanding the
cause

cause be totally removed; and that the action of infectious, and probably putrid vapours, in bringing on a fever, renders the body incapable of being farther affected by these vapours, in some cases, for a short time only, and in others for the whole life-time of the patient; and that therefore it seldom is of use, to employ any remedy to remove the cause of the disease after the fever has actually taken place.

II. *Observations on the Inflammation of the internal Coats of Veins.* By JOHN HUNTER, Esq. F. R. S. Surgeon Extraordinary to His MAJESTY, and Surgeon-general to the Army. Read Feb. 6, 1784.

THE following observations will shew that the inside of veins, as well as of all other cavities, is a seat of inflammation and abscess. I have found in all violent inflammations of the cellular membrane, whether spontaneous or in consequence of accident, as in compound fractures, or of surgical operation, as in the removal of an extremity, that the coats of the larger veins, passing through the inflamed part, become also considerably inflamed; and that their inner surfaces take on the adhesive, suppurative, and ulcerative inflammations: for in such inflammations I have found in many places of the veins adhesion, in others matter, and in others ulceration. Under such circumstances, the veins would have abscesses formed in them, if the matter did not find in many cases an easy passage

passage to the heart along with the circulating blood, so as to prevent the accumulation of the pus: but this ready passage of the matter into the common circulation, does not always happen. It is in some cases prevented by the adhesive inflammation taking place in the vein between the place of suppuration and the heart, so that an abscess is formed, as will be further observed.

Where the inflammation is most violent, there we find the vein most inflamed; there also, after suppuration, we find the purest pus; and as we trace the vessels from this part, either farther from or nearer to the heart, we find the pus more and more mixed with blood, and having more of the coagulated parts of the blood in it.

As these appearances are only to be seen in dead bodies, they cannot be described but from thence; but it is so common a case, that I have hardly ever seen an instance of suppuration in any part, furnished with large veins, where these appearances are not evident after death. I have found them in the bodies of those who have died from amputations, compound fractures, and mortifications.

These circumstances all considered lead us to account for a very frequent complaint, that is, an inflamed arm after bleeding; a complaint which has by some been imputed to the wounding of a tendon; because the tendon of the biceps muscle lies under some of those veins, in which we often bleed, and when the complaint occurs, it is unjustly supposed to arise from want of skill in the operator; by others it has been supposed to arise from the wounding of a nerve; and again it has been laid to the charge of a bad constitution.

But if we consider more critically this consequence arising from bleeding, we shall find that it happens frequently after bleeding in veins where no tendon could possibly be wounded; and also where no particular nerve could be in the way. It seems likewise to happen as frequently in constitutions where there is no appearance of want of health, as in those disposed to disease. As a proof of this last, upon bleeding in another vein in the same person, perhaps with a view to assist in the cure of the inflammation arising from the first bleeding, the wound has healed very readily.

If

If we examine the proportion which the number of those inflammations that happen after bleeding, bear to those which arise from as slight a wound where no large vein has been injured, and even perhaps where the wound has not been made by so clean a cutting instrument, and the same pains not taken to close it up, we shall find that those from wounded veins are much the most frequent; and that such inflammations seldom or ever happen under the last mentioned circumstances; therefore, we must look for some other cause to explain this effect of bleeding.

The manner in which those sore arms come on, shows plainly that they arise from the wound not healing by the first intention; for the external wound, in most cases, first festers or inflames, then suppurates and ulcerates, so that the cavity of the vein becomes impervious. In some this suppuration is only superficial, the vein and parts below having united. In others the skin shall appear to be united, but not close to the vein, so that a small abscess shall form between the skin and the vein; it shall burst and discharge a thin watery fluid, and no further mischief happen;

but when this imperfection of union is continued on to the cavity of the vein, then the vein inflames both upwards and downwards, and that often for a considerable way, and the surrounding parts join in the inflammation.

We find all these variations in different cases; for the disease sometimes goes no further than an inflammation in the vein near to the orifice, which is often resolved; at other times the inflammation is carried further, but suppuration is prevented by the adhesive inflammation taking place in the vein at this part, so as to exclude the suppurative inflammation, and the veins in such cases may be plainly felt after the surrounding tumefaction has subsided, like hard cords. But this salutary effect is not always produced, and suppuration in the vein is the consequence, but often so confined, that only a small abscess forms in the cavity of the vein near to the orifice. The confinement of the matter in this part of the vein, arises from adhesions in the vein a little above and below the orifice. But in many cases the inflammation and suppuration are not confined to this part from the adhesions not having taken place; for it frequently happens that an abscess is formed,
occupying

occupying a considerable length of the vein both ways; and we often have more than one abscess, nay at times there is a series of them, and generally in the direction of the vein, between the orifice and the heart; but not always in this course, for we find them sometimes between the wound and the extreme parts.

I have seen from a wound in the foot the vena saphæna inflamed all up the leg and thigh, nearly as high as the groin; and I have been obliged to open a string of abscesses almost through its whole course.

In cases where I have had opportunities of inspecting veins after death, in which the inflammation had been violent, upon examining the vein at some distance from this violence, I found the inflammation in the adhesive state: in some places the sides of the vein were adhering, and in others the inner surface of the veins was furred over with coagulable lymph. Where different abscesses had formed, I have always found that the spaces of the vein between them had united by the adhesive inflammation, and it is this union which circumscribes the abscesses.

Upon examining the arm of a man who had died at St. George's Hospital, I found the veins, both below and above the orifice, in many places united by the adhesive inflammation. I also found in many parts of the veins, that suppuration had begun as we find on an inflamed surface, but had not yet arrived at ulceration; and in several other places ulceration had taken place, so as to have destroyed that surface next the skin, and a circumscribed abscess was formed. The vein near to the axilla had taken on suppuration, beyond which adhesions had not formed, and this had given a free passage for the matter into the circulation, of which most probably the patient died.

In those cases where larger abscesses have come on than those formed simply from the ulceration of the wound made by the lancet, I have always found that the vein was afterwards obliterated, having united and healed up as any other cavity does, so that such patients could never be bled in the same vein again, which is a proof that the sides of the vein can unite by the adhesive inflammation.

Inflammation of a vein is a common effect after bleeding horses, which is usually done
in

in the neck. The operator on this animal does not always take sufficient care to close up the external wound; for although the method usually employed would at first sight appear to be a good one, that is, by a pin passed through the wound from side to side, as in the hare-lip, and over-tied by a thread or hair, yet, if not executed with sufficient attention, I should be inclined to believe that it is the very worst, as it very readily promotes inflammation in the cavity of the vein, either of the adhesive or suppurative kind, according as the ligature does or does not communicate with the cavity.

In some of these inflammations of horses I have seen the jugular vein inflamed through its whole length, and all the side of the head has been considerably swelled, and the inflammation carried along the vein quite into the chest. In these cases there is always an abscess formed at the wound, and often several along the vein, as in the human subject; and whenever the complaint is carried so far as this stage, the cavity becomes united at those places by granulations, and the vein is ever after impervious. Many horses die of this disease, but what is the particular circumstance which

which occasions their death, I have not been able to determine. It may either be that the inflammation extends itself to the heart, or that the matter secreted from the inside of the vein, passes along that tube in considerable quantity to the heart, and mixes with the blood.

I am inclined to believe that the exposure of cavities of the larger veins in cases of accidents, and also of operations, is often the cause of many of the very extensive inflammations which sometimes attend these cases, and indeed may be the reason why inflammations extend or spread at all beyond the sphere of continued sympathy. .

In all cases where inflammation of veins runs high, or extends itself considerably, it is to be expected that the whole system will be affected. For the most part the same kind of affection takes place which arises from other inflammations, with this exception, that where no adhesions of the sides of the veins are formed, or where such adhesions are incomplete, pus passing into the circulation may add to the general disorder, and even render it fatal.

In

In all cases of inflammation where adhesions take place, they arise from an extravasation of coagulable lymph; but how such adhesions should take place on the internal surface of veins, appears at first sight difficult to conceive, since it is most obvious, that the coagulable lymph thrown out by the exhalants on the internal surface of the vein, mixing with the same fluid circulating with the other parts of the blood, would be swept away without producing any effect. But since such adhesions do in fact happen, the coagulable lymph must undergo some change connected with the disposition which produces its extravasation.

Although the operation which is the most frequent cause of this complaint is to appearance trifling, yet as it is often of very serious consequence, both to the life of the patient and the character of the surgeon, it requires particular attention in the operator to prevent as much as possible an evil of such magnitude. With this view he will be particularly attentive to the mode of closing the wound, and binding up the arm. This is to be done by bringing the two sides of the wound together, that they may unite by the first intention.

tention. To accomplish this, let the surgeon, with the thumb of that hand which holds the arm, push the skin towards the orifice, while he draws it on the other side to the same point with the compress; thus the skin will be thrown into folds at the wound over which he is immediately to apply the compress. The compress should be broad, to keep the skin better together; and thick, to make the compression more certain. Another advantage arising from this caution, is the prevention of the vein bleeding a second time. I have known an inflammation attack the orifice, which appeared to have arisen from the first union having been broke through, and no second union formed; but this probably did not arise from the vein being opened a second time, but from the sides of the orifice not having been again brought together. I would recommend a compress of linen, or lint, in preference to sticking plaster; for I imagine that the blood drying over the orifice is a kind of bond of union more natural and effectual than any other application: and this conclusion is drawn from practice; for I have seen more fore arms in consequence of bleeding where
 plasters

plaisters have been afterwards applied, than from any other; and in cases of the compound fracture, when attempted to be cured as a simple fracture, if the wound will allow of being scabbed over, I have seen it always do well; whereas if it has been kept moist, or prevented from evaporating by plaisters, or other applications, it has always suppurated.

When inflammation takes place beyond the orifice, so as to alarm the surgeon, he should immediately make a compress upon the vein at the inflamed part, to make the two sides adhere together; or if they do not adhere, yet simple contact will be sufficient to prevent suppuration in this part; or if inflammation has gone so far as to make the surgeon suspect that suppuration has taken place, then the compress must be put upon that part of the vein just above the suppuration. This I once practised, and, as I supposed, with success.

III. *A Process for preparing pure Emetic Tartar by Re-crystallization.* By Mr. JENNER, Surgeon at Berkeley. In a Letter to JOHN HUNTER, Esq. Read June 4, 1784.

SIR,

I BELIEVE it is generally acknowledged, that no preparation of antimony obtains so much in the modern practice of physic as emetic tartar; yet how greatly ought it to be lamented, that a process of such consequence to the health of mankind has hitherto been conducted upon an imperfect plan. In the use of this valuable medicine, the physician's warmest hopes are too frequently allayed with fear: for, while so many *formulæ* for the composition of emetic tartar are extant in dispensaries and chymical treatises, the practitioner, wanting a fixt criterion of its quality, must often prescribe with uncertainty, and generally be disappointed in his conclusions. Indeed the faculty are well aware that a single grain prepared by one chymist may excite full vomiting, though the same quantity pre-
pared

pared by another may not even produce a nausea. These considerations, added to the great importance of the medicine itself, have induced me to attempt some experiments, with a view of bringing it to the greatest degree of purity. The result of these proved favourable to my wishes; and without entering into a tedious detail of them, I flatter myself that emetic tartar made according to the inclosed process, will bear the test of a scrupulous examination. It will be found to be a pure neutral salt, composed entirely of tartar and the reguline part of antimony, formed in crystals beautifully white and transparent, and perfectly soluble either in water or wine. I am,

Sir,

Your most obedient

and obliged servant,

Berkeley,

Feb. 5, 1784.

EDWARD JENNER.

The

*The Process for preparing pure Emetic Tartar
by Re-crystallization.*

TAKE cream of tartar and glass of antimony levigated, of each one pound. Mix them together, and pour upon them in a clean earthen vessel two gallons of boiling water. Stir the whole together a few minutes, and the cream of tartar will be fully saturated. Let the fæces subside, filter the liquor, and boil it immediately in a well-tinned vessel, till the whole be nearly evaporated to dryness. Pour as much boiling water on the emetic tartar, thus rudely formed, as will dissolve it; put it into an earthen vessel, and let it remain twenty-four hours. Emetic tartar will now be formed in crystals adhering to the sides and bottom of the vessel, but not perfectly bright and free from impurities. Decant the liquor, and boil it till a pellicle appears on the surface. Set it by to crystallize. Collect these crystals, and mixing them with those formed before, dissolve them in as much boiling water as is sufficient for that purpose. Filter the solution immediately; put it into clean glass vessels, and let it re-
main

main twenty-four hours. The crystals which appear now are in a perfect state. Having washed them with a little clean cold water, place them in the shade on white spongy paper to dry. To obtain the whole of the emetic tartar contained in the remaining liquor, the processes above mentioned must be again and again repeated.

IV. *An Account of the Dissection of a Man, that died of a Suppression of Urine, produced by a Collection of Hydatids, between the Neck of the Bladder and Rectum; with Observations on the Manner in which Hydatids grow and multiply in the human Body.* By JOHN HUNTER, M. D. F. R. S. and Physician to the Army. Read April 17, 1787.

THOMAS BELL, aged forty-six years, a carpenter, and a stout man, died suddenly, March the 17th, 1786. The following particulars were all that could be learned respecting his disease previous to his death: that he had been complaining for four or five weeks of more or less pain and difficulty in making water, which he himself supposed to proceed from gravel, but by those about him was suspected to arise from some venereal complaint. In consequence of this suspicion he was visited by a surgeon, who examined the *penis*, and found a natural *phimosis*, but no venereal complaint. When questioned respecting his difficulty of making water, he said, that he had been in much pain,
but

but was now easier, and that some urine had come away involuntarily. He was able to sit up in bed at this examination, but in an hour after, in attempting to turn himself, he expired.

The body was examined thirty hours after death.

Head.—The brain was in all respects natural; it was not firm, however, for so short a time after death. The water in the ventricles was in the usual quantity. The blood in the vessels was fluid both in the head and other parts of the body.

Thorax. The viscera were all found.

Abdomen. The belly was very tumid, which, on removing the common integuments, was found to proceed from the immense size of the bladder. It was distended enormously, and reached fully eight inches above the *pubis*; its fundus was within two inches of the arch of the *colon*. Upon letting out the water, which amounted to five or six pints, it appeared that there was a large tumour between the neck of the bladder and the *rectum*, which completely filled the pelvis, and thrust the bladder forwards and upwards. On cutting into the tumour much water

rushed out, and along with it many hydatids of various sizes; the largest was about an inch and an half in diameter, and the smallest not larger than a pin's head. The tumour was intirely filled with hydatids and the water that surrourded them, and both together they were more in quantity than a pint and an half. There were besides two or three smaller tumours near the neck of the bladder, also containing hydatids; and there were two bodies, not larger than common beans, adhering to the bladder, containing a soft cheese-like substance.

Between the stomach and the spleen, and over one end of the pancreas, there was a large tumour, to which the three above parts adhered; the stomach and pancreas slightly by cellular membrane; the spleen more intimately, so as to make a part of the tumour: with the spleen it was about ten inches in diameter. It was irregularly shaped, and made up of several smaller tumours. There was considerable variety in the contents of those tumours; in one there were hydatids of various sizes, like those mentioned above; in another there was a substance like isinglass, a little softened in water; in a third there was clear
 9 water

water in a considerable quantity, with very minute particles, like small grains, adhering slightly to the sides; and in a fourth there were hydatids, some full, others burst, and with their coats compressed together, and forming the isinglass-like substance. The tumours or sacs had all thick coats, endowed with a strong contractile power, that forcibly protruded their contents through any opening made into them. They had two coats; an outer, which was strongest and thickest, and an inner, which was tender, soft, and pulpy.

As to the structure of the hydatids, it was the same in large and small; a transparent bag, uniformly round and smooth, filled with clear water. The bag appeared to consist of two coats, or layers; for on handling them, the outer coat would get rumpled, and occasion a degree of opacity, but, by wiping the hydatid, it became again clear and transparent. They appeared to be completely spherical, except that the large ones were a little flattened by their own weight, when laid on a plate*. They adhered no where to the sides of the sac, nor to one another. When they were opened, their coats possessed a strong

* Vid. Plate Ist. Fig. 1.

contractile force, so as to roll themselves up in part. On examining a number of hydatids, some of them appeared of an amber colour, and with thicker coats than the rest; and when opened, their inner surface was found covered with small hydatids, which were not so large as the heads of pins, and looked like minute pearls or studs set in the inner coat *.

Some of the water containing the small grains mentioned above, was examined with a microscope, and found to have floating in it numerous minute hydatids; of which the largest were the little grains visible to the naked eye, and $\frac{1}{250}$ part of an inch in diameter; the smallest were less than a red globule of blood; and they were of all intermediate sizes. The coats of the largest were a little rough with numerous filaments, or *villi*; and, on using a deeper magnifier, they had somewhat of a mulberry appearance †.

When the young ones growing in the coats of the larger were examined with the microscope, they were found not to be set in the coats, like pearls, but to be covered by a

* Vid. Plate Ift. Fig. 2.

† Vid. Plate Ift. Fig. 3.

thin transparent membrane, so as to lie between two layers. It is not improbable that the small globules attach themselves by the *villi* to the side of the hydatid, and to each other, and thereby give the appearance of being covered by a thin membrane. However that may be, the globules being found of various sizes floating in the liquor, seems to prove that they are originally formed there, and not in the coats of the hydatid, upon which they are afterwards deposited. The number of those that had young ones in them, was few in proportion to the others.

The hydatids in their growth and decay appear to pass through various stages; they are first found floating in the fluid that fills the hydatid, and afterwards attached to its coats. The hydatid thus pregnant with young, if the expression may be allowed, adheres to the neighbouring parts, increases in size, and becomes itself a sac, containing numerous small hydatids. These after a certain time decay, and the skins or empty bags are squeezed together into a substance like isinglass. It is probable they still undergo a further change; two small bodies, of the size of the common bean, of a cheese-like con-

sistence, and covered with a skin, were taken notice of adhering to the bladder near its neck; it may be a question whether those were not the remains of hydatids? but that must be determined by future observations. It is to be observed, that the young hydatids are found in two very different stages; in the one they are attached to the coats of an hydatid, that floats loose in the parent bag or sac; in the other, extremely small globules adhere slightly to the inner surface of a bag or sac, which is firmly attached to the neighbouring parts, and covered with a strong outer coat. It is obvious that the progress of growth is very unequal in those two, and indeed inverted; for in the first the young ones are as large as the heads of pins, while the parent bag is not larger than a walnut, and floats unattached; but on the contrary, in the second there is a large sac with a strong outer coat, and a more tender inner one, adhering strongly to the surrounding parts, while the young ones, that are very slightly attached to its sides, are not of a larger diameter than a $\frac{1}{100}$ part of an inch. Whether those are merely accidental differences in the growth, or depend upon
some

some more essential distinction, must remain to be determined by future observations.

The term *hydatid* is used in different senses; thus the hydatids of the *placenta*, of the *ovaria*, and of the kidneys, which may be considered as morbid changes in the substances of those bodies, are totally different from the hydatids of the present case, which produce their like, and multiply in great abundance, without any further connection with the human body, except in so far as it affords them a nidus. The observations I am going to make are confined intirely to this last mentioned kind. They have been found in various parts of the human body; they have been discharged both by vomit and by stool *; they have been brought up from the lungs by cough †; they have been voided by urine; and they have been discharged from tumours in different parts of the body ‡. Le Cat has taken notice of their inner coat being covered with small *mamillæ*, an appearance produced by the young ones, and supposes them to be the glandular grains of the spleen distended

* Philosoph. Transact. Vol. xxii. p. 1797.

† Med. Transact. Vol. ii. p. 486.

‡ Philosoph. Transact. Vol. xxv. p. 2344.

with lymph. They have also been considered as diseased lymphatics; but it must be obvious, that the young ones growing within the larger, at the same time that these last are floating in a liquid without connection with the sides of the sac, cannot proceed from any disease in the lymphatic system, if by that be understood the absorbent vessels. It is unnecessary to animadvert upon Le Cat's opinion, as anatomy has not hitherto been able to demonstrate the existence of any glandular grains in the spleen, which appears to be a congeries of blood-vessels. It may be a question, whether the hydatids are not of an animal nature, and possessing a life peculiar to themselves? We are not yet in possession of a sufficient number of facts to ascertain this point; but the discoveries that have been made respecting the nature of hydatids in other animals, promise to throw some light upon the present subject.

The ingenious naturalist Pallas, in his *Miscellanea Zoologica* *, has given an account of the observations made by others upon hydatids, and added discoveries of his own. There are only two before him, who knew the hy-

* Ed. Hagæ Comitum, 1766, p. 157.

what Elie says here is true
after that

datids in animals to be alive, and to possess a peculiar structure and power of motion. Those were Dr. Tyson and Phil. Jac. Hartmannus. Pallas considers Tyson as the first discoverer, but seemingly without reason, for Hartmannus published his account in the year 1685 *; and Tyson in 1691 †. Neither of them appears to be acquainted with the other's discovery. Tyson observed the neck and mouth of the animal, and saw them in motion; Hartmann further saw the whole body in motion by putting them in warm water. Pallas has examined them very minutely, and gives them the name of *tænia hydatigena*, from finding their heads of the same structure as that of the *tænia*. But in all that Pallas saw he never found any pregnant, so that he was unacquainted with the manner in which they multiply. Goetze, a German writer, has given figures of the young ones adhering to the parent bag; and Mr. Hunter has preparations of that kind in his collection. The Abbé Fontana ‡ has observed them in sheep, seen the motion of the young ones adhering to the sides, and also with a microscope

* Miscell. Nat. Cur. dec. 2. An. 4to.

† Phil. Transf. for that year.

‡ Opuscoli Scelti, tom. 6.

examined the heads of them, and found them resembling those of *tæniæ*. So far the observations of authors go with respect to the hydatids of animals; in regard to the hydatids of the human species, Tyson has remarked that they are different from the former; that they are uniformly round, without any appearance of a neck or head; but he declines giving any opinion of their nature. Pallas * likewise mentions a kind of hydatids found in the human and other bodies, without any neck or mouth, but leaves their nature to be decided by future observations. He says their coats are very elastic, and when cut retract with so much force as to roll themselves up, turning the inside out.

It is not altogether allowable to conclude, from the resemblance of the human hydatids to those of quadrupeds, that the first as well as the last form a part of the animal kingdom; yet they agree in so many circumstances, that such a conclusion appears very probable. In quadrupeds they have their seat generally in the *abdomen*, and most commonly in the liver or spleen; the same is true of the human hydatids. In the human

* P, 172.

they multiply by the young growing on the inside of the hydatids ; and the same has been observed in quadrupeds. The analogy fails when we look for a mouth and neck in the human ; nor has any peristaltic, or undulating motion been observed in their coats ; but this last appearance has not been looked for in a proper way, that is, by putting them in tepid water as soon as they come from the human body.

With regard to the time requisite for the growth and decay of the different sacs containing hydatids, it is difficult to form a conjecture. Our patient was able to follow his trade as a carpenter till five weeks before he died ; it is probable therefore that in that time, or a little more, the sac between the neck of the bladder and rectum had grown to that size, which produced a suppression of urine and death. The growth and decay of the hydatids serve to explain the increase and diminution, which have been observed in tumours of the abdomen proceeding from this cause, as in the case mentioned in the Medical Transactions *. It will not be deemed out of place to mention some particulars of a dissection that have come to

* Vol. II.

my knowledge, that in a great measure explain the appearances in the case above alluded to, and confirm the truth of the conjecture subjoined to it.

A patient died in the Infirmary at Edinburgh, with the symptoms of the encysted dropfy. His abdomen was swelled with many irregular protuberances. On examining the body, there were found numerous encysted tumours full of hydatids. They had their basis in the liver, from which they proceeded not only downwards into the abdomen, but upwards into the thorax, and making their way through the diaphragm, came in contact with the lungs. Had the patient lived a little longer, it is not improbable that a communication between the bags containing the hydatids and some of the branches of the *trachea arteria* would have taken place, which must have produced the same symptoms as in the case abovementioned.

To return to the dissection. The hydatids did not appear to have done any injury to the parts, except by mechanical pressure, for the viscera were all uncommonly sound. Of the numerous cases of hydatids related by writers, it may be remarked that hardly any
of

of them proved fatal whenever they found an outlet. In the present case, the pressure upon the neck of the bladder, and consequent suppression of urine, are evidently the causes of death. The manner of death from such a cause is not unusual; after a time, the pain produced by the distention of the bladder ceases, there are no more efforts to make water, and yet the patient dies suddenly. This sudden death has been imputed to a translocation of the urine, as it has been expressed, to the brain. If any idea is to be annexed to these expressions, it must be, that the urine is effused either in the ventricles, or upon the surface of the brain; but no appearances of that kind were observable in the present case.

When the presence of hydatids is suspected, it would appear to be of great consequence to procure them an outlet; but it must be obvious, that being generally seated in the abdomen, that business must be left intirely to nature. Upon the supposition that they belong to the animal kingdom, no internal medicine promises to be of so much use as mercury, which appears to have been given in one case with advantage *. But this is a

* Med. Transf. Vol. II.

subject there is no entering upon without a greater number of facts.

To this account I will subjoin a query respecting the manner in which the hydatids came to be lodged between the rectum and bladder. It has been observed that they are most commonly found in the liver and spleen, and in the present case their original seat would appear to have been in the last of these viscera; may not, however, one of the sacs or bags in the spleen have burst, by which the contents would be spread all over the abdomen, and from their own gravity would naturally fall into the pelvis; and may they not have adhered to the neighbouring parts, and so multiplied there?

I have been more particular in relating the circumstances of this case, because such seldom occur even to persons in extensive practice; in consequence of which it often happens in rare cases, that the views and experiments suggested by one case, are of no avail, for want of another opportunity to verify them. It will therefore be understood, that what is advanced respecting their being endowed with a life of their own, and also
their.

their mode of breeding or multiplying, is given merely as probabilities, and as well deserving of further investigation, whenever opportunities may offer.

*Charles-Street,
April 17, 1787.*

S U P P L E M E N T.

IN the year 1788, I had an opportunity of examining some hydatids that were found in the abdomen of a sheep. Before I saw them the bowels had been taken out, and they were adhering to the fat about the kidneys, and also to the liver, and to the fat near the urinary bladder, in considerable number. They would appear to differ in some essential particulars from the human hydatids, yet they resemble one another in so many things, that there is reason to infer therefrom, that both belong to the animal kingdom. It appeared to me, that a short account of them would form a proper supplement to the case of human hydatids, read some time ago to the society.

The hydatids in the sheep were exactly the same with those described by Tyson *. They consist of a mouth, neck, and oblong spherical body. The mouth had nothing of the cruciform appearance, if I may be allowed the expression, that late writers have made the characteristic mark of *tænia*, and which they say is to be found in all hydatids. The mouth, examined with some care with the microscope, appeared to be a simple longitudinal aperture. The neck was composed of rings, and there appeared very fine circles surrounding the body. They varied in size, from that of a chestnut to the dimensions of a turkey's egg. When put in warm water, though it must have been twelve or fourteen hours after the sheep had been killed, they moved briskly, with a kind of peristaltic motion all over the body. Each hydatid was lodged in a separate sac, which was little more than sufficient to hold it, for the neck was reflected upon the body. The sides of the sac were lubricated with a mucous fluid.

The human hydatids have no neck or mouth, and they are in great numbers in the same sac, and of various sizes. In these par-

* Phil. Transf. 1692.

ticulars they differ from those of sheep; nor could I find any young ones attached to the inside of the hydatid, as in the human. In their mode of decay, however, they resembled each other completely. The sac became thicker and stronger, and at the same time diminished in size, and compressed the coat of the hydatid into a substance like isinglass. In the last stage this substance became like a mixture of chalk and water, and the side of the sac hardened, and appeared in some degree petrified; for the hardness was more like that of a stone, than of a bone.

I had, in the summer of 1791, an opportunity of examinng the hydatids which are found in the brain of sheep, producing the disease called, in some parts of the country, the *staggers*. The hydatid is lodged in the substance of the brain; in one sheep there were two hydatids, one in each hemisphere of the brain; they were of an irregular oval shape; they had no mouth; their coats had the same appearance as in the hydatids found in the abdomen; and, when put in warm water, they had a strong peristaltic motion.

In some there were clusters of young ones, adhering to their inner coats. These were

somewhat oval in their shape, and adhered by one end ; but on detaching them carefully, and examining them with good magnifiers, I could never find the cruciform mouth described by some writers.

We may observe, that the mouth is not essential to the hydatid in sheep, which renders it still more probable, if not altogether certain, that the human hydatid is an animal *.

* There being great reason to believe that hydatids form a distinct genus in the animal kingdom, and being so essentially different from the watery vesicles which are found in the *ovarium*, kidney, and *placenta*, it might be proper, in order to avoid ambiguity and confusion, to distinguish them by a name peculiar to themselves. Linnæus (a) calls the hydatid in sheep *Hydra Hydatula* ; but neither his generic character, nor specific differences, which are chiefly taken from the mouth, apply to the animals in question, in some of which there is no mouth. The Greek language, that inexhaustible source of derivation, readily supplies us with a name. The word ὕδρια, *Hydria*, is very apposite. If that be adopted, we shall have *Hydria Humana*, *Hydria Ovilla*, &c.

(a) *Systema Naturæ*, Vermes, Zoophyta, *Hydra*.

V. *Case of a Gentleman labouring under the epidemic remittent Fever of Bussorah, in the Year 1780; drawn up by himself; with an Account of various Circumstances relating to that Disease. Communicated by JOHN HUNTER, Esq. F. R. S. Read June 17, 1788.*

INTRODUCTION.

THE following case is that of a gentleman, not unacquainted with medical learning, tho' not of the profession. To this circumstance it is owing, that an explanation is necessary of the sense annexed to the term *plague*, which occurs frequently. Our author uses it in a somewhat vague sense, but probably such as is customary at Bussorah; and calls by that name the *remittent fever*, which prevails every year, with various degrees of violence, in consequence of the annual overflowings of the Euphrates. But there is no resemblance between the plague, properly so called, and the remittent fever; they differ in their symptoms, progress, and causes, of which any one may easily satisfy himself, by consulting the excellent treatise lately published by Dr.

Russell on the Plague. There is further this remarkable difference between them, that they prevail in different seasons of the year. The warm weather of the month of May puts an end to the plague at Bufforah, and it is not to be seen in the subsequent hot months; whereas the remittent fever begins in the month of May, in which the Euphrates usually overflows its banks in the neighbourhood of Bufforah, and prevails chiefly in the warm months that follow. Our author frequently mentions the plague of 1773, supposing the remittent fever, and that epidemic, to be the same disease; but that is not the case. It was the real plague which raged at Bufforah with such violence in 1773; and from authentic accounts of it in the possession of Dr. Russel, it appears that it first shewed itself in February, increased in March and April, began to diminish early in May, and by the end of that month intirely ceased.

It is impossible to read the narrative of the sufferings of the patient, without wishing that he had had the assistance of medical people, who had been acquainted with the proper mode of administering the bark in such fevers. The numerous remissions he had, furnished the best opportunities of giving it; and

and as in the end he owed his life to it, so there can be no doubt but a more early use of it, would have saved him from much suffering and misery.

EVER since the great plague of 1773, in which it is estimated seven-eighths of the inhabitants perished, Bussorah has seldom escaped, every third or fourth year, a visitation from some malignant putrid disease. Whole families died, and remained unburied, until covered by the ruins of their houses. Thousands were interred in the streets, but so near the surface, that I have seen the bones of the dead in many places appearing above ground. To complete the calamity, the inhabitants, in less than three years after this plague, sustained a siege of thirteen months against the Persians, in which they experienced every distress that the sword, sickness and famine, can inflict upon mankind.

The overflowing of the Euphrates, and its waters stagnating on the desert, have always been accounted the leading primary causes of epidemical diseases at Bussorah. The great floods, from the melting of the snow on the mountains of Diarbekir, happened in the year

1780 early in the month of May, when the heats in Persia and Arabia began to be excessive. The desert, which reaches to the gates of Bufforah, is, for many miles, incrufted with a surface of salt, which, when mixed with the ftagnated waters and expofed to the fun, produces the moft noxious effluvia. So early as the 25th of May, the town was furrounded with a falt marfh, the heated ftream arifing from which was, at times, almoft intolerable; but the canal that runs through a great part of the city being filled with the dead bodies of animals, and all kinds of putrid matter, and at low tides all thefe fubftances expofed to the fun, made the air in the town fcarcely fupportable; and being totally deftitute of police, the ftreets were in many places covered with human ordure, the bodies of dead dogs and cats, which emitted a ftench more difagreeable and putrid than any thing I ever experienced in my life.

From the accumulation of fo many caufes, it is not furprifing that epidemical diforders fhould have reigned at Bufforah in the year 1780; it is more wonderful that thefe difeafes are not both more frequent, and more fatal.

As to the degree of folar heat during the period of which I am about to fpeak, it far
exceeded

exceeded what I conceived the human frame to be capable of bearing. The sensation under this heat was totally different from what I had ever experienced; it resembled the approach of a heated substance to the body. According to Farenheit's thermometer the quicksilver rose in the sun to between 156 and 162 degrees. From the 30th of May I never saw it so low as 156, but generally between 158 and 160. The glass was fixed to a wall, covered at top, but exposed to the reflected rays of the sun. I am told, that after I left Bufforah it was several degrees higher.

In the coolest part of the house, with the aid of every invention to decrease the heat, the quicksilver rose to 115 degrees; but after I came away I was informed that it rose still higher, even at seven o'clock in the morning, the hour which we accounted the coolest in the day. Much about this time two gentlemen, who had hitherto escaped the infection, were taken ill, and fled from the factory; they reported that on the day on which they left Bufforah, the heat was so intolerable that no one could expose himself to it long enough to observe the thermometer in the sun.

I have

I have heard from some of the oldest inhabitants of Bufforah, that they never remembered to have felt, or to have heard of such a degree of heat in any part of Arabia or Persia. Before we were all taken ill, the natives of the country appeared more alarmed at the heat of the weather than the Europeans; nothing could induce them to expose themselves to the sun after ten o'clock.

From the 10th of May the people of Bufforah began to foretell that the season would be marked by a severe and general sickness. This prediction was soon verified; towards the end of the month an intermitting bilious fever made its appearance in the town, which in a very few days spread with such amazing rapidity, that upon a computation not a fourth part of the inhabitants were exempted from this calamity.

About the latter end of May I was sensible at times of extreme and unusual internal heat and glowings, with sensations which I cannot describe; and once or twice I perceived an inclination to shiver. I seldom made water more than once in twenty-four hours, and then in small quantities, and of a very deep colour.

colour. My appetite and every other circumstance continued as usual.

I left Bussorah for Aleppo the 30th of May. On our arrival at Zebire, the heat was so intense that even the Arabs sunk under it. Most of the gentlemen who had accompanied me to this place felt it in a still more severe manner. I was quite overcome; I felt an unusual languor, weakness, alternate heat and cold, and many other symptoms which indicated an approaching fever. I could not immediately be prevailed upon to relinquish my journey; and although upon reflection I had not a ray of hope that I should be able to proceed, yet at that time a disappointment appeared to me equally dreadful with certain death in the desert. At night every symptom increased, the ensuing day all hopes of pursuing my journey vanished, and in the evening I was carried back to Bussorah. In two days I got tolerably well, but pains in my back, loins, limbs, and great prostration of strength still remained. About this time two gentlemen of the factory were seized with the fever, which now began to rage with violence.

5th June. From this day I date the actual commencement of my fever. About two o'clock after dinner I was suddenly attacked with a violent glowing heat all over my body, uneasiness, anxiety, and oppression, but in a very inconsiderable degree to what I afterwards experienced; also a swelling in my tongue, which had been coming on some days, and is one of the first symptoms of the fever that prevailed. The fit continued about two hours; a slight perspiration succeeded, which removed the fever, but left a head-ach, thirst, and pains in my back and limbs. In the evening with assistance I got upon the terrace, when the moon and stars appeared of a bright yellow, and all objects had that colour through the whole of my disease; also the pain in making water and across my loins became intolerable, like that felt in complaints of the stone in the bladder. I took some tartar emetic, which brought up a great deal of bile, and the next morning a purgative of Rochelle salts, manna, tamarinds, and anniseeds.

6th June. In the forenoon a free, copious perspiration, and a perfect intermission of the fever; at night became very restless and uneasy,

easy, could not sleep, which I partly imputed to a draught of strong mustard whey, with some antimonial wine, which instead of causing perspiration, produced the opposite effect.

7th. By the advice of a physician I took some weak decoction of bark, 1 oz. to two pints boiled to one, in the quantity of three tea-cups full before dinner. At three in the afternoon I had another hot fit, but not very severe. In the evening grew worse, heat and thirst excessive, drank mustard whey on going to bed, but had a very bad night;—no sleep, much oppressed, severe head-ach, and pain over my loins.

8th. I took a gentle purge of cream of tartar and manna, which operated and gave me some ease. Left off the bark, as it seemed to increase the febrile symptoms, and drank sage and apple tea, decoction of prunes, tamarinds, &c. At ten o'clock in the forenoon a very severe hot fit; heat intense, oppression in my stomach and breast almost insufferable. Mr. ——— surgeon of the Eagle cruiser, gave me a most nauseous saline mixture, which vomited and purged me severely. The quantity of bile which came off my sto-

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mach was incredible, yet I felt no relief, and the agony of the hot fit continued till four o'clock in the afternoon, when it went off by a most profuse perspiration. During this fit my thirst was constant and intense. In the evening my skin became dry, the thirst returned, and I had a very bad, sleepless night.

I now began to experience some of the dreadful symptoms which are I believe peculiar to fevers in Turkey and Arabia, a sensation of dread and horror totally unconnected with the fear of death, for while the patient is most afflicted with this symptom, it is for the most part accompanied with a strong desire to put an end to his existence. The agony from the heat of the body is beyond conception; I have heard some of my fellow-sufferers roar hideously under the violence of the pain.

9th. Till noon tolerably well. About one o'clock the hot fit attacked me, and was full as severe as yesterday; heat and thirst rather greater, and but little relief for more than an hour after the perspiration commenced. This attack left me very weak, much exhausted with cold weakening sweats,
quick

quick unequal pulse, severe head-ach, confusion, anxiety, and incessant thirst; a sleepless night, startings, anxieties, and a constant wish to terminate my sufferings by death.

10th. Forenoon, pretty free from fever. Attacked at the same hour as yesterday. The fit more violent, delirium. The agony of the heat not to be expressed; the whole body as if on fire; unremitting thirst, profuse perspiration, yet no relief till late in the evening; no sleep, a dreadful night, &c. Pulse about 120, unequal and fluttering.

A mere relation of facts can give but a faint idea of the wretched situation to which the factory was now reduced: by this time eleven twelfths of the inhabitants of Bufforah were taken ill, numbers were daily dying, and the reports from Bagdad and Diarbekir of the increasing ravages of the plague, left the survivors not a ray of hope that they could escape from the calamity. On every countenance pain, sickness and horror were strongly painted; nor were we even left the comforts of sympathy, as every mind was too much engrossed with its own sufferings to think of administering consolation to others. Four of us lay under the portico of one of the squares

of the factory, calling out for water in a phrensy of thirst. We used to snatch it from each other, and to supplicate for a mouthful with as much fervor as a dying criminal for an hour of further life.

About this period of the fever my eyes became very weak, and every object I saw was quite yellow. This effect was most perceptible at night, in looking at the moon and stars. In the evenings we were sometimes carried in our cots upon the terrace of the factory for air, but the wind was so heated by the burning sands of the desert, that we felt it more intolerable than even the lower apartments. We all remarked that the She-maal, or northern winds, which blew without intermission at that time, greatly increased our heat and thirst.

The daily very evident increase of my fever, and its effects upon others becoming every day more fatal and alarming, determined me, while any strength remained, to embrace the consul's offer of flying from the seat of infection to Bushire, in the Ranger cruiser.

11th. After an exceeding bad night I was carried early in the morning on board the Ranger, and was not very ill until about nine o'clock,

o'clock, when I felt the fever coming on; with new and more alarming symptoms, violent head-ach, giddiness, dimness of sight, approaching delirium, horror, and a most painful oppression and burning heat in my stomach.

In despair, and to try to quench the unsufferable heat in my stomach and bowels, I took a pretty large dose of nitre. The oppression and pain increased, in my confusion I took a paper of tartar emetic, which immediately began to operate. From that time, about ten o'clock, till half past two in the afternoon, I know but little of what passed: I was almost all that time either distracted with pain, or in a swoon; and had it not been for the extraordinary care and attention of the commander of the cruiser, who supported me in his arms, and administered such cordials as I, in the short moments of recollection, could call for, I have not a doubt but I must have sunk under this attack. He counted eight times that I fainted, and sometimes an interval of ten minutes before he could perceive any symptoms of returning life. I was chiefly supported by wine, hartshorn, and spirits of lavender. About three o'clock

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I had recovered my recollection: most copious and continued sweats had carried off the violence of the fever, but faintings and total privation of strength and spirits remained upon me till late in the evening, when I became to all appearance, for a short time, perfectly well. A little strength returned, every symptom of fever vanished, and my feelings were almost the same as if in perfect health. Some circumstances having prevented the Ranger's carrying me to Bushire, I was taken ashore in the evening. When I was brought to the factory I had an appetite, and ate some chicken broth for supper. Mr. Ross, who had hitherto escaped the fever, administered a potion of laudanum, and, I believe, antimonial wine, on going to rest. I slept pretty well, and waked refreshed in the morning. I, however, soon became ill; and at noon I had a severe attack, which continued three or four hours, and left me greatly weakened, my skin extremely dry, pulse quick, fluttering, and irregular, beating from 100 to 120, with an unquenchable thirst, which no liquids could allay. We had no acids of any kind, which we had great reason to regret.

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I did not know till late in the evening that Mr. Abraham, the vice-consul, who for some days past had been ill of the same fever, had determined to embark in the Eagle cruiser next morning for Bushire, as the only chance of saving his life ; and a conversation which I overheard to this effect, that as I was so very ill, and no hopes of my recovery, it would be better to leave me behind to die at Bufforah, made me still more anxious to fly from the place, although I remember well I had not the most distant hope that I could live. I had suffered much at the factory, and in the peevishness of illness I thought (perhaps unjustly) that my living or dying seemed to be a matter of too little consequence to those, whom in health I had treated with much kindness and affection.

About ten o'clock, as I was lying in my cot, on a terrace adjoining to the stairs from whence the boat was to put off, I was seized with such a fluttering, palpitation, starting, difficulty of utterance from the swelling of my tongue, that I lay in momentary expectation of breathing my last. This was, however, probably the cause of my hearing the preparations for the departure of the boat.

About midnight they were leaving the shore. I could not make myself heard, and I was too weak to get up without help. I made several efforts, and at last overset the cot I was lying upon, and brought myself to the floor, from whence I crawled on my hands and knees to the side of the river. Humanity pleaded for me, and I was taken into the boat in a situation of wretchedness I never can forget. We were, after being several hours on the Euphrates, carried on board the *Eagle*, opposite to Margil, a country house belonging to the factory, a few miles distant from Bussiorah.

12th. The day was uncommonly hot, and my fever came upon me about ten o'clock. The heat was intense. Mr. —, a young unexperienced Frenchman, gave me tamarind water and cream of tartar, which had not a good effect. I now discerned the first symptom of a cold fit, but it was slight, and of short duration. This day, however, I supported the fever rather better than usual, and in the evening had a short intermission, and slept a little during the night. The air on the river was this day cooler and more refreshing than on shore.

13th.

13th. About eleven o'clock had a regular cold shivering fit, succeeded by a very severe hot fever, which continued till five in the evening, when I was somewhat relieved by perspiration.—This day the agony of the hot fit was inexpressible, with great pain in my loins, and a constant inclination to make water, which came from me in drops like blood.—I had a very bad sleepless night.

14th. By Mr. —'s advice, I took a dose of tartar emetic, which not working, he gave me some ipecacuanha. I brought up a great deal of bile, but the fever increasing, my sufferings under it were greatly increased by the operation of the emetic, which worked powerfully both upwards and downwards.—This was a trying day indeed. I can give no idea of what I suffered, which must have been intolerable, attended with intervals of delirium, and frequently swooning. About five the fever began to abate a little, and at six Mr. — gave me a small dose of decoction of bark, which seemed instantly to cause a return of the fever, heat, thirst, anxiety and pain.

My fellow-sufferer, Mr. Abraham, was in violent agony this day; he cried out repeat-

edly, that a fire was consuming his bowels, and that he was in exquisite torture. The captain of the cruizer had been complaining; he, Mr. Abraham, and myself, lay in the same cabin. About four o'clock in the afternoon, when my pain was excessive, I crawled from my cott, with an intention to drop myself from a port-hole which was under the captain's bed, into the river. I had nearly accomplished my purpose, when the captain perceived me, and had me carried into my bed. I was not delirious; and, in spite of all my resolution, the agony I suffered this day made me repeatedly scream out. One of our seamen died suddenly, and the blood, I was told, instantly flowed from all parts of his body.

This evening we arrived at Bushire. On our coming to an anchor, Mr. Abraham was immediately carried ashore; but I was too ill to be moved, and accordingly followed in the morning with Captain Sheriff, after a very severe sleepless night.

The heat was so excessive this day, that even the natives we had on board sunk under it, and many of them were struck down with the sun. By noon nobody could keep the deck;

deck ; and about this time the vessel run aground on the bar at the mouth of the Euphrates, but fortunately beat over, and got into the gulph. Two more of our people died in the evening ; and I should have mentioned, that, in sailing down the river, we saw them throwing many dead bodies from the vessels which were at anchor below Bushorah, and many boats crouded with people from the Arabian shore, passing over to Persia.

The Persians at first opposed the landing of our sick, and threatened to burn the ship ; but they were prevailed upon, by the company's agent at Bushire, a most worthy man, to permit us to come ashore.

15th. I was so weak, that it was with difficulty they could carry me ashore in my cott ; my strength was quite gone, and I was helpless as an infant. Some grapes, water-melon, and ice, had been got for Mr. Abraham : of the latter he had eat freely ; I was much pressed to do the same, but I was afraid of its increasing my pain, and could hardly be prevailed upon to taste it ; I, however, swallowed a little, but by this time my tongue and throat were so swelled, that I had diffi-

culty in getting any thing down. About ten o'clock I was attacked as usual, but I was become so weak, and the fever running even higher than usual, that I appeared in the course of this day, more than once, to be in the agonies of death; perspiration gave no relief to the violent pain and oppression I laboured under.

The factory at Bushire is a miserable, wretched, mud building, bearing much more resemblance to a stable than a human abode; the few rooms, or rather cells, are insufferably hot, even to those in health, and the rest of the building has no cover from the sun. In one of the best of these recesses in the wall Mr. Abraham and I were placed, and on the same bed, as there was not room for two; our agonies were great, our cries dreadful. About seven o'clock in the evening I perceived my companion in the agonies of death. The company's agent, Mr. Beaumont, most humanely afforded him every assistance in his power; and, when every other person was afraid to come near us, he himself attended, and administered such cordials as he thought might give us relief. Mr. Abraham died in great pain; and for fear of
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alarming the inhabitants, or rather commandant or sheik of the town, Mr. Beaumont thought it necessary to conceal his death. It was some time before the dead body could be removed, which had become very putrid, and covered with purple spots. I have been since told, that immediately after death great quantity of blood or bile flowed from him, as black as ink, and so highly offensive, as to be smelt at some distance from the factory. Past midnight we were both removed to the terrace, but, unfortunately for me, there was only one spot where we could lie, and the smell of the dead body was become intolerable; I was, however, by the humane assistance of Mr. Beaumont, cleaned and put into another bed, who sat by me, and treated me with uncommon tenderness. I recovered a little, but passed a dreadful night indeed. I shuddered at the agony which I was to feel on the return of the sun, and most anxiously wished for death, as the only relief from pain, that I could expect. I was unable at this time to move hand or foot, and at times could not speak. I told Mr. Beaumont that I thought a gentle dose of physic, if it could be got down, might alleviate the racking pain
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in my breast, stomach, bowels, and loins; he accordingly prepared some salts, manna and tamarinds, and gave it to me in the morning.

16th. At eleven o'clock the violence of the fever came on; I grew delirious, swooned, and the symptoms of approaching death, I was afterwards told, grew evident to those around me. My eyes were fixed, my tongue hung from my mouth, and my face grew quite black. I recovered from this fit about twelve o'clock, and felt excruciating pain, and a burning suffocating heat. My stomach and bowels seemed all on fire, my lungs played with the utmost difficulty, and I felt a pain and sensation about my heart which I cannot describe. I was unable to move; my servant lifted me; I fell into a swoon for a few minutes, and, when I came to myself, a great quantity of black putrid bile flowed from me. Relief was instantaneous, and I slept or swooned till about five o'clock, when I found myself free from fever, and able to speak, my recollection clear, and my mind perfectly composed, but my body so weak that I had no power of moving, except one of my hands. They gave me some sustenance; I had a little sleep; but
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about midnight I fell into a situation, which I had all the reason to think indicated the immediate approach of death. My tongue cleft to my mouth, my extremities were as cold as ice, and the coldness also appeared to extend up my thigh; my arm was destitute of pulse, nor was the smallest pulsation of the heart perceptible; I never had my recollection clearer, or perhaps so clear, in my life. My servant was lying by my bedside; I was convulsed for some minutes; and, on recovering, I got out the word Boy.—Fortunately for me he was not asleep, and heard me; I then got out the word Wine; on which he brought me a glass of claret, which, with much difficulty, I got down; I felt myself much revived; I reflected on my situation; and, although I had not the most remote idea of surviving that night, I recollected that I had some fine powdered bark in my trunk, and it occurred to me, that if any thing could be done to preserve my life, it would be that medicine taken in red wine; but my speech immediately failing me, I could not direct the servant to give it to me. Death seemed approaching; coldness had seized all my limbs; my sight became confused, as I perceived
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from looking at the stars, which danced before me ; and the rattle or noise in my throat was very perceptible to the servant, as he afterwards told me. I fainted, and continued in a state of insensibility, I believe, for about an hour. The loud lamentations of the servant, bewailing his own misfortune in losing his master in a country so remote from his own, seemed to recal me to life. I felt as if refreshed with a little sleep, and got out the words *bark and wine* ; it was instantly brought, and the man gave me two large tea-spoonfuls, in a large glass of claret. The effect was instantaneous, and operated like a charm ; the coldness left me, I could speak intelligibly, and could move my hands. I told the servant to give me a tea spoonful of the bark every hour, in a glass of claret. By eight in the morning I had taken six doses, and more than half a bottle of claret. I was considerably strengthened, and could converse with Mr. Beaumont, who encouraged me to persevere in the bark, and treated me with uncommon attention. I had been sadly neglected at Bufforah, but this was amply made up to me by the humane and tender attentions of Mr. Beaumont, who was a great predestinarian,

destinarian, and who never shunned danger when he felt it a duty to assist a fellow-creature. He waited upon me like a nurse, consoled me under pain and sickness, and, when my fever was at its greatest height, he has often held me in his arms, when I wanted to be removed, or my bed shifted. About this time my legs and thighs became covered with blotches of a dusky brown hue, some of them as broad as the palm of the hand, quite dry, and they itched intolerably. At the same time several little boils broke out in different parts of my body, but there was only one, over my eye, which came to suppuration; the others, and the eruption on my legs and thighs, all disappeared.

I continued the bark till twelve o'clock, and then left it off till four, when I took another dose. The dreadful fever of the preceding days did not return on this, but I was still extremely ill, had very great difficulty in speaking and breathing; a swelling also in my throat, parched tongue, and unquenchable thirst. I had not the most distant hope of living. I tried to take some broth, but the swelling in my throat prevented my swallowing. I passed a very bad night, with startings, anxiety, and great
 pain

pain over the kidneys, and what little sleep I got seemed to make me worse; I was fatigued with it, and under the constant dread of suffocation; towards morning my throat grew worse, and my thirst was excessive.

18th. Left off the bark, uncertain what I ought to do—no fever, but the same symptoms as the day before—drank a little chicken-broth, which was the only sustenance I had taken for four days before; great oppression and heat in my stomach and bowels. Mr. Beaumont found out an Armenian, who professed physic. This man gave me a clyster, which gave me great relief, and a water to drink, famous as a febrifuge among the Persians; I drank of it freely, and found much benefit from it. But the most extraordinary of all the symptoms I experienced was this, that the third day after the first intermission of my fever, one of my teeth, and one of the nails of my hand, came out without the smallest pain, only a little swelling in the gum, and, on the nail falling off, some matter flowed from the end of my finger; I never had had the tooth-ach; at this time the boil on my eye suppurated.

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From the 18th of June to the 5th of July, being seventeen days, my fever did not return. I recovered strength slowly, and could walk a little, supported by two men. My food was chiefly chicken and veal broth, and about a glass and a half of *Madeira* wine a day. Yet I had still many symptoms of disease hanging about me—restless fatiguing nights—great thirst—bad taste in my mouth, every thing I took seemed bitter and salt; pains in my back, sides, and loins, and great difficulty in making water. In this time I passed much bile, naturally and by clyster, and I had a purgative from the Armenian, which weakened me greatly.

The springs lifted, as seamen express it, the 1st of July, that is three days before the change. The opinion is universal in those countries, and also in India, particularly *Bombay*, where intermittents are prevalent, that the change and full of the moon has an effect upon all intermitting diseases, of which afterwards I had many proofs in my own case. To prevent a relapse, I took some decoction of bark, but in too small quantities to answer the purpose.

4th July. My water, from being thick and muddy, became quite clear.

The 5th of July, after dinner, I was taken with a slight hot fit, which continued about two hours, and then went off by copious perspiration; the remaining part of the evening I was intirely free from fever.

6th. I took decoction of bark—no fever.

7th. At eleven o'clock a regular cold and hot fit; the former continued three quarters of an hour, the latter two hours. Although much less severe than my former fever, yet I suffered a good deal from the hot fit. Left off the bark by the advice of the Armenian, who told me that it heated me, and made me worse.—Much weakened by this day's illness—nor did the perspiration intirely free me from the fever.

8th. Had a clyster thrown up, and early in the morning took a draught from the Armenian, composed of fine vinegar, sugar, and a country seed infused overnight in water.—A slight hot fit, but of short continuance.

9th. The draught of yesterday repeated—at ten a regular cold and hot fit, rather less violent than the last.

10th.

10th. No fever—tolerably well.

11th. Between eight and nine in the morning a cold and hot fit, much more severe than the last—great heat, thirst, and oppression—much weakened. I now perceived I had got a regular tertian, and determined on the bark, but was prevailed on by the Armenian not to use it, he promising to cure me in a day or two. He gave me water-melon, and his infusion of vinegar and feeds.

12th. No fever—find the water-melon to disagree greatly with my stomach.

13th. Had not as yet indulged much hopes of a recovery. I felt still, even in those days previous to this last relapse, many alarming symptoms of disease, which made me apprehend I could not recover; and this last attack had again reduced me so low, that it was evident that, unless I could get removed from those scorching climates, a very short time would put an end to my life. Except in the humanity and goodness of Mr. Beaumont, I was without a single comfort or conveniency of life at Bushire. The heat of the weather seemed daily to increase, and the house we were in hardly covered us from the direct rays of the sun. My servant was taken ill,

and appeared to be dying: it was with the greatest pleasure, therefore, I received the accounts this day of the Eagle cruizer having arrived last night from Bufforah, on her way to Bombay.

At half past seven o'clock I had a very severe fit—the hot fit was uncommonly violent, and continued about three hours. I was much reduced, and resolved, at all events, to take the bark in powder and in large doses, and dismiss the Armenian. In this I was confirmed by Mr. Puget, who informed me that the few survivors at Bufforah owed their lives intirely to the bark, which had at last been given in very large doses.

14th. I took four doses, or eight teaspoonfuls, of powdered bark. It purged me, and carried off a great quantity of black putrid bile.—This evening I was carried in my cott on board the Eagle; resolved at all events, even if I had been certain of dying in the boat, to leave Bushire, where I had hardly shelter from the sun, and where the heat was so excessive, that Capt. Alderson of the Eagle, and two passengers, were taken ill from it last night. I got on board very late,
yet

yet found myself much refreshed from the sea air.

15th. The fever did not return.—I continued to take the bark as yesterday, and found myself surprisingly strengthened. I persevered under this course till the 3d of August, when the vessel arrived at Muscat, and I was astonishingly recovered for the shortness of the time.

From the 14th of July to the 3d of August I had taken seven ounces of bark; and as the fever had returned upon me the last day of the springs at the preceding change of the moon, two days before this change I increased my daily dose, and continued in this manner till the 4th, when the springs being over, and perceiving no symptoms of fever remaining, I left off the bark intirely. I had generally taken six tea-spoonfuls every day.

From the 15th of July till my arrival at Muscat, a sea-port on the coast of Arabia, my recovery was exceedingly rapid. I had a keen appetite, a pretty good digestion, found refreshing sleep, and my daily increase of strength was very perceptible. My diet, till this time, had been generally chicken broth,

rice, and boiled fowl, light pudding, &c. On leaving off the bark I observed no particular regimen, only abstaining from salted and high-seasoned meats, and confining myself to three or four glasses of Madeira. I found that an infusion of prunes, with a small quantity of cream of tartar, was of much service to me during the course of the bark, as it kept me cool, and my body open. I was sensible, at times, during my recovery, of a slight but troublesome pain under my fifth rib on the right side, especially when I lay on that side; but from feeling and pressing my hand over the region of the liver, and from other circumstances, I had no reason to suspect that my liver was affected; and as it soon left me, the cause was probably trifling or accidental.

On my leaving Muscat, a large boil came upon the hip-bone, the size of a small melon, extending some way up the side and down the thigh, with a hard basis. After arriving at Bombay, which we did in fourteen days, it broke, and in a few days healed up. I shall only add, that at Bombay I was detained four months, before I had an opportunity of proceeding to Europe. In that time I had

three returns of my ague, but, on taking a few doses of bark, it left me. Those attacks happened at the change of the moon. From Bombay to Europe I had three or four slight fits of the ague; the worst on our making the coast of South Guinea, at the settlement of Benguela, where we found the wretched remains of a Portuguese garrison, the survivors of a fatal putrid fever, which, as they told us, raged in those parts for eighteen months before. The last attack I had was the day we made the Rock of Lisbon, since which time I have had no returns of the ague, although, when the wind continues long at east, I am sensible of a tendency to that complaint.

I shall now give a brief account of the fate of my fellow-sufferers at Bufforah. This unfortunate party consisted of Capt. Sheriff, of the Eagle cruiser; Mr. Brown, a Bengal merchant, carrying goods from India to Aleppo; Mr. Palmer, a gentleman returning with his fortune from Bengal to Europe; Mr. Robson, surgeon to the factory; Mr. Abraham, the vice-consul; Dr. Ross, who had practised many years at Constantinople, some time in Bengal, and was then taking the opportunity

of accompanying me across the desert; Mr. Smith, a merchant from India; and an Italian Carmelite, the vicar of Bufforah, who came from Bombay. It is unnecessary to say, that the *seeā dāb* is a common symptom in the Turkish fever, or, in other words, a strong desire of self-destruction. We had a fatal instance of it in our party. Mr. Brown, the second day of his fever, being left alone, got to his pistols, and, throwing in four or five balls, discharged it into his breast, and was found dead a few minutes afterwards. I believe every one of us at times would have done the same, had we been possessed of the means of accomplishing it. Mr. Robson died the third day of his fever in great agonies, but perfectly sensible; his was a continued high fever, without any remission. Mr. Palmer died the fourth day under the same symptoms as the preceding. The Carmelite, the second morning after he was taken ill, had opened a vein in his arm, and bled to death, most probably intentionally. Captain Sheriff was seized with the fever on his return from Bufforah to Bushire. He died on the third day in a manner which is even painful to relate. He was a man of singular strength of constitution,

tution, and suffered unusual agonies before he died. His cries were heard all over the factory; he foamed at the mouth, gnashed his teeth, and tore his arms with his teeth. Those who heard him compared his cries to the bellowing of a mad bull. He was no sooner dead but his body was covered with purple spots, and so offensive that the people could hardly carry it out to be buried. Mr. Sheriff's was what they call the worst kind of plague.

Mr. —, whom I have mentioned, was an uncommon character. He was shut up in a mud house at Bufforah during the great plague in 1773, which he escaped. He had fortunately a large stock of Bengal cotton goods with him, which he disposed of to the inhabitants to wrap their dead in. They used to deposit the price in a basket, which by means of a long rope he let down, which was then hauled up, and lowered again with the cloth purchased. He had an account of 70,000 winding-sheets which he sold during the calamity. This fact was attested by Mr. Abraham and the consul. He was a well informed sensible man, and an excellent linguist. On his voyage to Bufforah he was seized with

a species of insanity : he suspected the captain and supercargo of his ship to have conspired his death, and he fancied he overheard their deliberations on the subject : he always slept with pistols in his cott, and refused all manner of communication with his conspirators, as he called them. He then imagined himself possessed of the singular faculty of overhearing, by the peculiar construction of his ears, the most distant whisper to his prejudice. Although such an idea was absurd, yet he could argue upon it with a great deal of ingenuity. In all other respects he was perfectly reasonable, and conversed on every other subject with much good sense and propriety. On the breaking out of this sickness at Bussorah he shut himself up in the upper room of an Armenian's house, and had no intercourse whatever with the other Europeans. It was not known how he existed ; he, however, escaped the infection. He afterwards came to England, where I have seen him, and he appeared perfectly well.

Dr. Ross, whom I have mentioned, on the first rumour of the plague put himself under a course of bark, which he continued taking in large quantities while I remained at Bussorah.

rah. I have since seen him in England, and he told me that when the illness began to abate, he was taken with an intermitting fever; that he fled from Bufforah in an open boat towards Bagdat, but was taken by a party of Arabs, who carried him upon the desert. He contrived to get away from them, crossed the desert to Aleppo, and afterwards got to England.

It was computed that 275,000 died in the town of Bufforah of the plague of 1773, and that 25,000 died in the town and neighbourhood of this last plague. We heard of its approach from Asia Minor; it ravaged Diarbekir, antient Assyria, and kept the course of the river Tygris to Bagdat, where many died. From thence it followed the course of the Euphrates to Bufforah, and for about twenty miles lower. The opposite, or Persian shore, although within a few miles, was exempted; nor did it spread more than a few miles into the desert.

The first symptoms of this fever, or plague, are generally swelling of the tongue, a violent head-ach, bleeding at the nose, pains all over the body, a constant inclination to make water, which comes in drops, and attended with
great

great pain, and is as high-coloured as blood ; (if the urine, on standing, becomes purple, it is said to be a certain sign of death) extreme heat, great apprehension, all objects appearing of a yellow colour, uncommon terror, and at the same time a great desire for death ; there are also boils or eruptions on the skin, which most commonly appear either just before the disease proves fatal, or the patient begins to recover.

VI. *On the Want of a Pericardium in the Human Body.* By MATTHEW BAILLIE, M.D. F.R.S. and Physician to St. George's Hospital. Read Dec. 16, 1788.

IT is of importance to ascertain any deviation from the ordinary structure of animals, because it either assists in explaining some circumstance in the animal œconomy, or tends to give a more accurate view of nature. This, however, is not equally the case with every deviation; but it is of more consequence to ascertain it in proportion as it may be rare, as doubts may have arisen with regard to it, or as it may be more connected with any great operation of an animal body. In which ever of these lights we consider the singular phenomenon of a want of pericardium, it is very worthy of being noted.

This is one of the deviations from the ordinary structure of an animal in which nature has been most sparing; very few anatomists have had an opportunity of observing it, and the description which those few have given

has been very imperfect *. The appearance also of an adhesion of the pericardium to the heart might be mistaken for a want of this membrane altogether ; and hence the best modern anatomists have considered this lusus as never having taken place. Even Haller, who was by no means disposed to be incredulous, has denied its existence. An opinion thus taking its origin from the authority of the most eminent anatomists, had at length spread into a general belief that the want of a
pericardium

* I have met with the following instances of a want of pericardium being observed by different anatomists.

“ Discipulum item in Romanâ Academiâ mortuum secui (aderat excellens Medicus Alex. Trajanus Petronius, a civitate Castellânâ, acris judicii vir) huic misero juveni pericardium de erat, itaque subinde in syncopen incidebat, subinde mortuo similis conspiciebatur, quo genere morbi exanimatus est.”—Reald. Columb. Lib. xv. p. 265.

“ Cor pericardio plane denudatum quod & semel Columbo observatum. Dextra auricula circa venæ arteriosæ orificium aneurysmatis modo ultra juglandis magnitudinem distenta erat.” Vid. Barthol. Centur. iv. Histor. 20. p. 266.

“ Monf. Littre a trouvé dans une femme de 54 ans le cœur sans pericarde & enfermé absolument à nud dans la cavité de la poitrine. Il étoit sec dur d’une surface inégale, raboteuse, il avoit peu de graisse & une graisse peu onctueuse. On voit assez par ce qu’il y avoit d’extraordinaire dans ce cœur à quoi doit servir le pericarde, &c.”—Mémoires de l’Académie Royale, p. 37. 1712.

pericardium had never occurred in the human body. It will appear, however, that this general opinion has been taken up too hastily, and that such a lusus does sometimes happen.

Upon opening into the cavity of the chest in a man about forty years of age, in order to explain at lecture the situation of the thoracic viscera, I was exceedingly surprized to see the naked heart lying on the left side of the chest, and could scarcely at first be-

“ Il naquit à Grenoble un fœtus monstrueux mort mais quï sa mere avoit senti remuer peu de tems avant sa naissance,” &c.

“ Celui la (scilicet le Fœtus) portoit son cœur en dehors pendu a son col comme une medaille de sorte qu’il pouvoit aller & venir sur la poitrine. Ce cœur etoit d’une conformation naturelle sans pericarde, attaché a ses gros vaisseaux qui lui tenoient lieu de cordons & qui etoient a decouvert comme lui. M. de Vau-bonnais envoya cette relation à M. Parent bien attestée par des mediciens & des chirurgiens de Grenoble.”—Id. p. 39.

“ Qu’il (scilicet le Cœur) puisse etre sans pericarde je l’ai vu dans un chien fort vigoureux, mais je suis ici un temoin recusable, mes amis sçavent pourtant que j’ay de la bonne foi par excez & que je suis sincere dans le choses mesme ou mon interet m’obligeroit de dissimuler.”—Discours iv. p. 111, 112. Paris 1685.

“ In fine, I have observed in a new-born female infant the heart without a pericardium, and turned upside down, so that its basis, with all its vessels, had fallen down as low as the navel, and its apex, still on the left side, lay hid between the two lungs.” Philosoph. Transactions, An. 1740—1741. N° 461.

lieve what I saw, but the circumstances were too striking to keep me long in doubt. The heart was as bare and distinct as it commonly appears in opening into the cavity of the pericardium, and every collateral circumstance confirmed the fact.

The mediastinum consisted, as in common cases, of two laminae of pleura; but it was somewhat changed in its direction, being inclined to the right side of the chest, and lying upon the right of the heart. Both laminae were connected together through the extent of the mediastinum by the common intervention of the cellular membrane, and crossed over the vena cava superior about an inch above its entrance into the auricle. The heart lay loose in the left cavity of the chest, unconnected in any way except by its vessels; was of a large size, elongated in its shape, and had its apex opposite to the eighth rib. The right auricle was obviously in view in the same manner as when the pericardium has been opened, and the vena cava superior and inferior were clearly observed entering into it. The appendage of the left auricle was as clearly in view; and when the heart was inverted, so as to have its apex turned
upwards,

upwards, the extent of its cavity was seen, with the two pulmonary veins of the left side entering behind the appendage. The right and left ventricles were distinct, with the coronary vessels running upon them; and the aorta and pulmonary artery were seen clearly emerging from them.

The heart was involved in the reflection of the pleura belonging to the left side of the chest, which became its immediate covering, and, upon making the slightest incision into the substance of the heart, its muscular structure was laid bare, as in any common heart deprived of its pericardium. There was no connection between the heart and the diaphragm, but they were entirely separate, and the diaphragm opposite to the flattened part of the heart was covered only by a reflection of the pleura. It is well known, that, in ordinary cases, a portion of the pericardium adheres firmly to the diaphragm, which forms a medium of connection between it and the heart. In adhesions, too, of the pericardium to the heart, its attachment to the diaphragm is always the same as in the ordinary healthy structure of these parts.

The

The apex of the heart being lower down than usual, there was a deficiency of the left lung corresponding to this change of situation.

The phrenic nerve of the right side ran between the two laminæ of the mediastinum, near that edge of it which was applied to the right side of the heart. The left phrenic nerve ran between the same two laminæ of the mediastinum, almost immediately under the sternum. This is a great deviation from its natural course, for it commonly passes on the outside of the pericardium, following the obliquity of the left edge of the heart.

All these circumstances were seen upon simply removing the sternum with a small portion of the ribs, and therefore put the want of pericardium in this subject beyond all doubt.

In the adhesion of the pericardium to the heart, the direction of the mediastinum cannot be altered, the heart cannot be seen lying loosely in the cavity of the chest, unconnected with the diaphragm, the appearance of its several cavities and vessels cannot be distinct, nor can any of the other circumstances take place which we have mentioned.

Did

Did the ascertaining of this singular *lufus naturæ* require any other evidence than the description which we have given, it would happen to be supported by a very large testimony, for it has been seen by many medical gentlemen in this metropolis, who are eminently skilled in anatomy, and by a great number of students, who are very capable of judging.

In this *lufus* we may remark, that the *mediastinum* passed somewhat to the right, so that the heart was intirely in the left cavity of the chest. Upon a little reflection we should suppose that this would happen. Had the *mediastinum* been joined to the body of the heart, it would have been disturbed in its function, from being confined by a tight cord to the sternum. To avoid this inconvenience, the *mediastinum* was situated a little more to the right, and the heart a little more to the left, than common.

The right phrenic nerve passed very naturally between the *laminæ* of the *mediastinum*, for this was nearly its usual course; but that of the left phrenic nerve was necessarily much changed. It could not pass over the body of the heart, or of the lungs, which were each

of them to be in constant motion; it had therefore to seek for some fixed channel, and the only one was in the mediastinum. Accordingly it was found, as described, between the two laminae of the mediastinum, almost immediately behind the sternum.

It was natural to suppose, as there is a deficiency of the lungs in ordinary cases, opposite to the apex of the heart, that where the apex of the heart was altered in its situation, there should be a change in the situation of the deficiency in the lungs corresponding to it.

It may be a question, how far the increased bulk and elongated shape of the heart, in this particular instance, depended on a want of the pericardium? It might be supposed that the heart, being free from its usual restraint, had grown beyond its common limit. This, I think, however, will appear, after a little reflection, not to have been the case. The heart, under the common circumstances, is originally inclosed in a pericardium which grows along with it, and the increase of growth keeps pace in each. If, then, there should be at any time a disposition to form a large heart, there is also formed a large pericardium to contain

contain it; or if the heart be small, there is proportionably a small pericardium. If it be still said, that the pericardium tends to limit the growth of the heart, a question naturally arises, What checks the growth of the pericardium? Is it a principle within itself? Why should not the heart be possessed of the same principle? I consider, therefore, the increased bulk and elongated shape of the heart, in this particular instance, as an accidental circumstance, and by no means depending on a want of the pericardium.

From the want of a pericardium in an adult who had arrived at the middle period of life, it is reasonable to think that its use is not very essential. One use which has been attributed to the pericardium is, the secretion of a liquor to lubricate the surface of the heart for its easy motion. This sort of reasoning would appear *à priori* to be ill founded. It is impossible to see how a bag like the pericardium, or any other bag, should be peculiarly fitted for this purpose. The surface of the heart itself, and of the lungs, might have had a power of secretion; and accordingly we find in this particular subject a fluid supplied by them for lubricating the heart

without a pericardium. This account of the use of the pericardium was very unsatisfactory to the mind of Haller, and upon the grounds we have mentioned.

The more striking use of a pericardium is to keep the heart in a steady situation, so as to enable it to carry on its function uniformly. This one is more disposed to consider as its use from its being a very strong membrane, capable of bearing a good deal of resistance; and from its being firmly attached to the tendinous portion of the diaphragm, which preserves always nearly the same situation. If we reflect, however, a little, we shall perceive, that a heart without a pericardium is not really left loose in the cavity of the chest, but is confined in a great measure by the parts being exactly adapted to each other, and completely filling up that cavity. The heart may in this manner be sufficiently confined to perform its function, although it cannot be so steadily maintained in the same situation as when enclosed in its pericardium.

Such are the circumstances which present themselves to the mind as matter of reasoning in the case before us; but I was anxious to learn something of the history of the person

son during life, because it appeared not unlikely that it might throw light upon the subject. My inquiries, however, have been without effect. I cannot find that any particular observation had been made upon the pulse by the physicians who attended him. It is not fair to conclude from thence, that the action of the heart is exactly the same whether it be inclosed or not in its proper membrane; but it is surely enough to shew that the action is not very much affected by the want of it. The different considerations which have been mentioned above, will serve, I hope, in some measure to explain this effect, and to point out how the circulation may be carried on, even for a very long period, under these particular circumstances.

EXPLANATION of PLATE II.

- A. THE sternum broken off at the joint between its first and second bone.
- B. The mediastinum directed a good deal towards the right side of the chest, and consisting evidently of two laminae of pleura.
- CC! The edges of the diaphragm, which, together with the lower end of the mediastinum, was pulled upwards at the time the drawing was made, in order to give a more distinct view of the left side of the chest.
- D. The heart seen naked, as it appeared upon simply raising the sternum.—The two ventricles, the right auricle, the aorta, the pulmonary artery, and the vena cava superior, are seen distinctly.
- E. The lung of the left side collapsed.
- F. The space between the heart and diaphragm, shewing that there was no connection between them.
- G. A portion of the lung on the right side seen collapsed.



VII. On INTROSUSCEPTION. By JOHN HUNTER, Esq. F. R. S. *Surgeon Extraordinary to the King, and Surgeon General to the Army.* Read August 18, 1789.

INTROSUSCEPTION is a disease produced by the passing of one portion of an intestine into another, and it is commonly, I believe, from the upper passing into the lower part.

If the mode of accounting for introsusception, which I am going to offer, be just, it will most frequently happen in the way I have stated, although there is no reason why it may not take place in a contrary direction; in which case, the chance of a cure will be increased by the natural actions of the intestinal canal tending to replace the intestine; and probably from this circumstance it may oftener occur than commonly appears.

When the introsusception is downwards it may be called progressive, and when it happens upwards, retrograde. The manner in which it may take place is, by one portion of

a loose intestine being contracted, and the part immediately below relaxed and dilated; under which circumstances it might very readily happen, by the contracted portion slipping a little way into that which is dilated, not from any action in either portion of intestine, but from some additional weight in the gut above. How far the peristaltic motion, by pushing the contents on to the contracted parts, may force that into the relaxed, I will not determine, but should rather suppose that it would not.

By this mode of accounting for an accidental intussusception, it may take place either upwards or downwards; but if a continuance or an increase of it arises from the action of the intestine, it must be when it is downwards, as we actually find to be the case; yet this does not explain those in which a considerable portion of intestine appears to have been carried into the gut below: to understand these, we must consider the different parts which form the intussusception. It is made up of three folds of intestine; the inner, which passes down, and being reflected upwards, forms the second or inverted portion, which being reflected down again, makes
the

the third or containing part, that is the outermost, which is always in the natural position.

The outward fold is the only one which is active, the inverted portion being perfectly passive, and squeezed down by the outer, which inverts more of itself, so that the angle of inversion in this case is always at the angle of reflection of the outer into the middle portion or inverted one, while the innermost is drawn in. From this we can readily see how an intussusception, once begun, may have any length of gut drawn in.

The external portion acting upon the other folds in the same way as upon any extraneous matter, will, by its peristaltic motion, urge them further; and, if any extraneous substance is detained in the cavity of the inner portion, that part will become a fixed point for the outer or containing intestine to act upon. Thus it will be squeezed on, till at last the mesentery preventing more of the innermost part from being drawn in, will act as a kind of stay, yet without entirely hindering the inverted outer fold from going still further. For it being the middle fold that is acted upon by the outer, and this action continuing after the inner portion becomes fixed, the gut
is

is thrown into folds upon itself; so that a foot in length of intestine shall form an intorsusception of not more than three inches long.

The different appearances which I have described as taking place in an intorsusception, are distinctly seen in the annexed plate, in which the different folds of intestine are exposed.

I have asserted that the outer portion of intestine was alone active in augmenting the disease when once begun; but if the inner one was capable of equal action in its natural direction, the effect would be the same, that of endeavouring to invert itself, as in a prolapsus ani; the outer and inner portions, by their action, would tend to draw in more of the gut, while the intermediate part only would, by its action, have a contrary tendency.

The action of the abdominal muscles cannot assist in either forming, or continuing this disease, as it must compress equally both above and below, although it is capable of producing the prolapsus ani.

In cases where intorsusception begins at the valve of the colon, and inverts that intestine, we find the ilium is not at all affected;

which proves that the mesentery, by acting as a stay, prevents its inversion.

From the natural attachment of the mesentery to the intestines, one would, at the first view of the subject, conceive it impossible for any one portion of gut to get far within another; as the greater extent of mesentery that is carried in along with it would render its further entrance more and more difficult, and we should expect this difficulty to be greater in the large intestines than in the small, as being more closely confined to their situation; yet the largest intromission of any known was in the colon, as related by Mr. Whately*.

The intromission appeared to have begun at the insertion of the ilium into the colon, and to have carried in the cæcum with its appendix. The ilium passed on into the colon, till the whole of the ascending colon, the transverse arch, and descending colon, were carried into the sigmoide flexure and rectum. The valve of the colon being the leading part, it at last got as low as the anus; and when the person went to stool he only emptied the ilium, for one half of the large

* Vid. Philos. Trans. Vol. lxxvi. page 305.

intestines being filled up by the other, the ilium alone, which passed through the center, discharged its contents.

Since that time the following case has occurred, which is in many respects similar; the patient was attended by Dr. Ash, and the body inspected after death by Mr. Home. A. B. aged nine months, a large healthy well-looking child, who, as far as appeared, had never been indisposed from his birth, was seized with a strong spasm, stretching himself out suddenly, without having had any symptoms of previous ailment. Either during the spasm, or immediately after it, he passed a very large loose stool, and after that discharged, at intervals, small quantities of mucous slime, covered over with little specks of recent fluid blood. Dr. Ash visited him four or five hours after this attack, and found him in all other respects perfectly well; the child sucked heartily, but Dr. Ash, on observing his pulse to be less quick than is usual in children so young, his heat to be rather below the common standard, and, added to these, the small mucous and bloody discharges, suspected that mortification had taken place in the bowels, without being able to guess at the cause, as the
child

child had laboured under no previous indisposition. In this uncertain situation, various means of relief were attempted by purgatives, fomentations, the warm bath, and different kind of clysters, but without any good effect. On his first examination of the abdomen he felt (or thought he felt) a deep-seated fullness or hardness under the left hypochondrium; blisters were applied to the part, and every possible means attempted, without obtaining any evacuation by stool, or any other apparent relief; his strength gradually sunk, and his pulse became gradually weaker, although he continued to take the breast eagerly till within a few hours of his death, which happened just sixty hours after the first spasmodic attack.

The following were the appearances found in the dead body. Upon opening the abdomen, the small intestines considerably distended with fluid contents, occupied so much of the cavity as to prevent any of the other viscera from being seen; and the mesentery was so much confined, that the convolutions of the small intestines could not be readily followed. This confinement was found to arise from an intorsion of the ilium and its mesentery, together with the cæcum, and ascending colon

lon into the descending part of the sigmoide flexure of the colon, the mesentery of the ilium being drawn up so obliquely across the root of the mesentery, as to prevent the jejunum from having its usual freedom of attachment.

The only part of the colon which could be seen was the sigmoide flexure, in which was distinctly to be felt a hard substance, consisting of the ilium and inverted colon. These parts being removed, for the purpose of a more accurate inspection of them, the sigmoide flexure of the colon was laid open, and was discovered to contain the cæcum, and colon in an inverted state. The internal surface of these, when exposed, were found to have put on a dark red appearance, approaching to black; the whole appearing like a solid substance, rounded at the end, hanging loose into the descending colon, and about four inches long. Upon dividing the inverted colon, the ilium and appendix cæci were seen lying close to each other, and their two openings found on the rounded end of the inverted colon, leading directly into the sigmoide flexure; the portion of the ilium was a little twisted, but not in the least corrugated, it was rather stretched

stretched, and much pressed against the appendix cæci and its own mesentery, by the surrounding colon, and a convolution of the appendix near the termination was so much pressed against the ilium as to make a mark upon it, and probably had compressed its sides so as to prevent any thing from passing. The portion of ilium was about four inches long.

The inverted colon had drawn in the mesocolon, and a portion of the omentum that was attached to the transverse arch. The portion of the colon near the valve, which formed the extremity of the inverted part, was much thickened in its substance by the effects of inflammation, being four or five times its natural thickness; it was a good deal corrugated, or folded upon itself, the folds at this part seemed to adhere to one another, and form one mass. The inflammation and thickening only extending two inches, the gut becoming gradually thinner till it was of its natural thickness and appearance; so that what was only four inches in length of intussusception, contained a considerably greater length of intestine.

The sigmoide flexure, which was the containing intestine, had the natural appearance,
but

but was dilated or relaxed, and the other contents of the abdomen were in a natural state, nor had the child any other apparent disease. A representation of the parts is annexed.

From the account I have given of introfusception, it does not seem probable that it should be of the retrograde kind, unless from an inversion of the peristaltic motion, which could only continue for a short time, and the natural motion being restored, a cure would probably be performed.

This disease happens most frequently in the first fifteen years of life, not occurring so commonly in older people, neither does it, I believe, ever take place in the colon itself, although we find that gut affected by it *.

An introfusception can never be perfectly known till after death; but where there are violent affections of the bowels, attended with constipation, we have reason, from the cases

* A prolapsus ani is, in some respects, similar to an introfusception, and may possibly begin in the same way, but is continued by the action of the abdominal muscles, never by the action of the gut itself. It differs from introfusception as not being contained in a gut; for, instead of having an inclosing gut inverting itself by its own action, there is an inclosed gut protruded by the action of the abdominal muscles, and the passing of the feces through it, and the point of inversion is at the extremity of the protrusion, and as it inverts it pushes out of the body.

which

which have been examined in the dead body, to suppose that this disease may be the cause of them: there are, however, so many other diseases which produce the same symptoms, that nothing can be ascertained. But if an intromission is suspected, it will be proper, in the mode of treatment, to suppose it to be of the progressive kind.

In the treatment of this disease various methods have been proposed; bleeding, to lessen the inflammation that might be brought on, and quicksilver to remove the cause, are the most obvious, and the means that are usually recommended.

Quicksilver would have little effect either in one way or the other, if the intromission was downward; for it is to be supposed that it would easily make its way through the innermost contained gut, and, if it should be stopped in its passage, it would, by increasing its size, become a cause (as before observed) of assisting the disease. In cases of the retrograde kind, quicksilver, assisted by the peristaltic motion, might be expected to press the intromission back; but even under such circumstances it might get between the containing and inverted gut into the angle of reflection,

flexion, and, by pushing it further on, increase the disease it is intended to cure.

From the account I have given of the manner in which it is produced, I should propose the following treatment in cases of progressive intorsusception.

Every thing that can increase the action of the intestine downwards is to be particularly avoided, as tending to increase the peristaltic motion of the outer containing gut, and thus to continue the disease. Medicine can never come in contact with the outer fold, and, having passed the inner, can only act on the outer below, therefore cannot immediately affect that portion of the outer which contains the intorsusception; but we must suppose that whatever affects, or comes in contact with the larger portion of the canal, so as to throw it into action, will also affect by sympathy any part that may escape such application. I should therefore advise giving vomits, with a view to invert the peristaltic motion of the containing gut, which will have a tendency to bring the intestines into their natural situation.

If this practice should not succeed, it might be proper to consider it as a retrograde intro-

introsusception, and, by administering purges, endeavour to increase the peristaltic motion downwards.

S U P P L E M E N T *to the Paper upon*
INTROSUSCEPTION. *By Mr. HOME.*

THE following case of introsusception upwards has been communicated to me by the late Mr. Smith, surgeon at Bristol; in whose collection of morbid preparations I saw the parts which had been removed from the dead body, and preserved in spirits. That the introsusception was upwards, is sufficiently ascertained from the preparation.

The particulars of the case, as far as they came to the knowledge of Mr. Smith, who examined the body after death, were as follow:

A cabin-boy belonging to one of the ships lying in Bristol harbour, was corrected by his master for some misconduct, at which the boy was very much exasperated, and, in the heat of his passion, swallowed some arsenic, which had been laid in different parts of the

ship to poison rats. He was attacked with violent pain in the stomach and intestines, attended with excessive vomiting, and expired before any medical assistance could be procured.

Upon inspection of the body, the internal surface of the stomach was found inflamed to a very great degree, the inflammation extending a considerable way along the tract of the small intestines, and in the ilium there was discovered an intromission of above two inches long, formed by a portion of the lower part of the gut having been inverted, and pushed into that immediately above it.

On flitting up the intestine, to examine the intromission more accurately, a long round worm was found coiled round the projecting intromitted part, and is preserved in that situation in the preparation.

The circumstances under which the round worm was found, determines the kind of intromission, since I have observed that species of worm more commonly in the upper portion of the small intestines, in which situation having been disturbed by the effects of the arsenic, it had consequently moved, to get at a greater distance from the poison. It is likewise probable, from the coming on of
inflamm-

inflammation, that vomiting, an immediate effect of the poison, by which the peristaltic motion was inverted, and the introfufception produced, had been followed by a contrary action, or disposition to purging; by which the worm being hurried along till it came to the introfufcepted part, was there stopped, and, in the endeavour to extricate itself, had twined round the projecting part, in which situation it died. If the introfufception had been downwards, the worm could not have been in that situation.

It is probable, that if the boy had outlived the immediate effects of the arsenic, and the peristaltic motion had perfectly recovered itself, the introfufception would have been by that means unfolded.

EXPLANATION of PLATE III.

- a.* THE ilium passing into the introsufception.
- b.* The portion of the ilium included in the introsufception.
- c.* The termination of the ilium in the valve of the colon; from which a bougie passes into the intestine.
- d.* The orifice of the appendix cæci with a bristle introduced into it.
- e e.* The course and termination of the appendix cæci.
- fff.* The inverted or contained portion of the colon, the inner surface of which has portions of coagulable lymph adhering to it, the consequence of previous inflammation.
- g g g.* The containing colon laid open, to expose the introsufception. Upon its external surface are the appendiculæ epiploicæ.



VIII. *Of uncommon Appearances of Disease in Blood-vessels.* By MATTHEW BAILLIE, M.D. F.R.S. and Physician to St. George's Hospital. Read September 15, 1789.

IT is of consequence to remark singular appearances of disease in the body, even if they should not obviously lead to any useful observations in practice; because they open a more extended view of the operations of the animal œconomy, point out more clearly the resources of nature, and render the invention of the mind more generally fitted to assist, when her efforts would otherwise be ineffectual. It is in this point of view that I think the following remarks upon some uncommon appearances of disease in blood-vessels, may not altogether be unworthy of notice. Two of the appearances which I shall describe are certainly very rare, and the other by no means common.

It is known to every person who is acquainted with the animal œconomy and pathology, that the blood coagulates, under certain circumstances, in the vessels of the living body. One case in which it coagulates is,

when a ligature has been made upon a vessel, and the blood is prevented from flowing thro' it at that part, as in the artery of an amputated limb. Another case in which it coagulates is, when a vessel is dilated at any part into a sort of bag, so that the blood there moves slowly, and as it were out of the course of the circulation. The coagulum begins to be formed at the greatest distance from the current of blood; or, in other words, close to the sides of the dilated bag at the greatest distance from the cylindrical cavity of the artery. It is very rare that a coagulum is formed in an aneurysmal artery, until it is considerably enlarged beyond its ordinary size, and the blood is a good deal removed from its natural course of circulation. It is still more rare that the coagulum fills up the whole cavity in which it is formed, so as to prevent the circulation altogether through that part of the vessel. Were this last circumstance often to take place, it would frequently become the natural cure of aneurysm, and supersede the very painful means of a doubtful operation. It sometimes happens, however, that nature deviates from the ordinary course of diseased operation, and forms a coagulum so complete, as to fill up entirely the cavity in which it takes place,
without

without there having been any previous stoppage to the circulation by a vessel being rendered impervious, and where a vessel is not much enlarged beyond its ordinary size. I had an opportunity of observing this in the carotid artery of a man, who was brought, about two winters ago, to Windmill-street for dissection. The whole of the arterial system in this man had a tendency to aneurysm, the natural structure being in many places changed, and the diameter of the arteries being somewhat enlarged beyond their natural size. There was, however, no part dilated into a bag or sack, containing a coagulum, except, as I shall immediately explain, in the carotid arteries.

In the right carotid artery, just before it divides into the external and internal carotids, I found an oval uniform swelling, about an inch and an half in length, and the diameter of the artery was scarcely enlarged to more than twice its ordinary size. The swelling was firm, giving the same resistance to the feeling as a healthy absorbent gland, and, if it had been felt through a thin layer of muscle, would certainly have been mistaken for one of a large size. I mention this comparison, to give a more distinct idea of the

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the tumor. When I cut through the coats of the artery, I found its cavity completely filled with a firm coagulum of blood, which had not the appearance of blood being recently coagulated after death, as in the beginning of the pulmonary artery, but had the appearance of an old aneurysmal coagulum.

The coagulum adhered every where so firmly to the inside of the vessel, that, in separating it, the inner coat was, in many places, peeled off along with the coagulum. In cutting into its substance, I found it consisting of distinct layers, as in a common aneurysm. There was no part of it which had the appearance of being recently formed, and, therefore, there cannot be any doubt of its having existed for a considerable time before the man's death. It is obvious then, that in this case a coagulum had been formed in the carotid artery, undergoing the same process as in aneurysm, and that the tendency to aneurysm had remedied itself. The whole cavity being filled up with the coagulum, there was no circulation whatever at this part; hence the cause of further dilatation was removed, and there was no danger of the rupture of the vessel, which is the principal danger in this disease.

A few

A few cases only have been related by authors of aneurysms being cured without any surgical operation, and even some of these have been suspected not to be authentic. Two cases have occurred lately to Mr. Ford, surgeon, described by him in the London Medical Journal, about which there can be no doubt. Mr. Home has offered a very ingenious explanation of such cases, founded on observations made by Mr. Hunter on the state of arteries in mortification, viz. that it is probable the blood coagulates in the artery above the seat of the aneurysmal bag, so as to render it there impervious. This explanation, although it accounts sufficiently for the case to which it immediately refers, yet is not applicable to all cases where aneurysms undergo a natural cure. In the one which I have related there was no coagulum of blood formed except in the dilated part of the artery, no steps whatever towards mortification had taken place, so that the natural cure depended entirely on the coagulum formed where the artery was enlarged. The blood here had coagulated much more readily than in proportion to the dilatation of the artery, so that the whole cavity was filled up before it had enlarged

enlarged to any considerable size. Wherever there is a disposition in the blood to coagulate greater than in proportion to the enlargement of the artery, the coagulum will at length fill up the whole cavity of the dilated part, and produce a natural cure of aneurysm. This state of the blood, or rather of the coagulable lymph, may arise from some connection or sympathy it may have with the diseased structure of the artery, but it is perhaps impossible to determine this with certainty.

We may remark, that in the left carotid artery of the same person, exactly before its division into the external and internal carotids, a dilatation and coagulum were formed; but the dilatation had more the shape of a common aneurysmal sack, and the coagulum did not entirely fill up the cavity of the vessel. There was only, however, a small canal for the current of blood, and I am inclined to think that the whole cavity would very soon have been filled up, so that on this side also there would have been a natural cure for the aneurysm.—From the situation of the two carotid arteries I shall just beg leave to observe, that it is not improbable a person might
live

live without circulation through a part of the main trunks of both carotid arteries, so that if it should become absolutely necessary in any surgical operation, they might be taken up by ligature. Mr. Hunter, in his Lectures upon Aneurysm, has mentioned nearly the same opinion*.

Of the OBLITERATION of VESSELS.

IT is well known, that under certain circumstances both arteries and veins become changed in their structure, losing their cavities, and degenerating into a sort of spongy ligamentous substance. This happens when it is no longer necessary that the blood should

* This opinion is in some measure confirmed by an experiment made by Valsalva, where he tied up both carotid arteries of a dog, which lived for two and twenty days afterwards, and might have continued to live, but that he was killed for the purposes of dissection. In two other experiments, of the same sort, the dog lived a much shorter time; in one instance three days, and in another six.—Vid. Valsalv. Opera, Cura Morgagni; Epist. xiii. p. 507.

It would require a great many experiments to ascertain the common event of such an operation; but from what has been said it appears very obvious that it is capable of succeeding, and it could never be proposed by any person of common understanding, except as the only means left of saving a patient's life.

circu-

circulate in them, as in certain changes in the circulation of an animal at a particular period of life. When a child is born, it is necessary that the whole blood of the body should be carried through the lungs, in order to undergo a change which is intimately connected with life, and that there should be no other communication between the blood circulating in the pulmonary artery and in the aorta, than through the lungs and the left side of the heart. Hence the ductus arteriosus gradually contracts itself after the birth of the child, till at length it becomes a sort of ligamentous substance *, without any cavity. The time which is occupied by this process is not long, although it varies in different persons, and in some few instances the vessel has been found in the adult state not entirely obliterated. In proportion as the ductus arteriosus contracts itself, the two branches of the pulmonary artery become enlarged, till at length they are able to convey to the lungs the whole of the blood which is thrown out

* Although I have mentioned here, and in other parts of this paper, that blood-vessels degenerate into a sort of ligamentous substance, the expression is not perfectly accurate. When their cavities are obliterated, they resemble a good deal ligament, but they still retain many properties of structure which belonged originally to them, especially their elasticity.

by the right ventricle of the heart, and in this way the full circulation through the lungs is completed. In the same manner the umbilical arteries and vein degenerate into a ligamentous substance when all communication between the child and placenta has ceased, and when the blood is to be thrown in different channels for the growth of the child. It sometimes happens, however, (although I believe it to be extremely rare) that there is a process of obliteration without any of these circumstances, depending upon some disposition in the vessels, which we cannot explain.—Some years ago a woman was brought to Windmill-street for dissection, in whom the vena cava inferior was found to be changed into a ligamentous substance, from the entrance of the emulgent veins even to the right auricle of the heart. The cavity here was so entirely obliterated, as not only to prevent all circulation of blood through this part of the vein, but even in a great measure to prevent the admission of air by inflation. It was in an attempt by Dr. Hunter to inflate the vein from the lower extremity which made this peculiarity be discovered. The blood being prevented from passing thro' the vena cava inferior, flowed into the lum-
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bar veins, enlarging them gradually as that vein became contracted, till at length they were of a sufficient size to receive the whole blood which returns by the vena cava. From the communication between the lumbar veins and the vena azygos, the blood passed into this vein, and was conveyed to the heart. It happened in this particular instance that there was an additional vena azygos, upon the left side of the spine, so that the blood was conveyed more readily to the heart than if there had been one vena azygos, as in ordinary cases. The enlarged veins were in some places thrown into varices, as must naturally take place under the circumstances we have mentioned. What time was consumed in the obliteration of the vena cava inferior, it is impossible to say; but, if we consider the process as analogous to the obliteration of the ductus arteriosus, and the umbilical arteries and vein, it could not be long; we ought not, however, to rest a very strong opinion upon this analogy*.

* We ought not to rest any strong opinion upon this analogy, because it is easy to see a reason why the obliteration of the cavity in the ductus arteriosus and umbilical arteries should be a short process; but there is not the same reason for its being a short process in the obliteration of the vena cava inferior, which we have just described.

This case shews, that, on some occasions, a process of obliteration takes place in the blood vessels, independent of the natural circumstances formerly explained. It shews also the very great resources of nature, that it can bear the function of the largest vein in the body to be suspended without endangering the life of the animal ; for it cannot be doubted that the obliteration we have mentioned had no share in producing the woman's death. The blood still circulated in the common quantity to and from the heart, but at one place it took a circuitous road instead of a direct one. I think the natural resources of the body in this particular to be so great, that I should not hesitate to believe, if the aorta was to be obliterated in any part of its passage between the origins of the superior mesenteric and inferior mesenteric arteries, that the circulation could be carried on by the communicating branches of these two vessels, together with the smaller aids of the anastomoses in the lumbar arteries.

It is reasonable to think, that where an obliteration takes place in any artery or vein, there are pretty large collateral vessels ; where there are none, or very few collateral branches, the difficulty of the blood's being

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impelled

impelled into other channels, would probably prevent the obliteration from taking place. In the natural obliterations we find, that there are always in the neighbourhood vessels of considerable size. Thus near the ductus arteriosus are the two large branches of the pulmonary artery; near the umbilical arteries are the large and numerous branches of the internal iliacs; and near the umbilical vein are the large branches of the vena portarum. In the same manner, in diseased obliteration of vessels, the collateral branches must be sufficiently large to carry off the current of blood * †.

* Morgagni mentions an instance of the same sort of obliteration in veins, and considers it as extremely singular.

“ Iliaca igitur vena dextra æquo erat latior, at sinistra ejusque rami tenues adeo & pallentes ut rem nunquam antea a me visam miratus cavæ imum truncum aperuerim. Quo facto vel magis miratus sum. Nam pro Iliacæ ejus venæ ostio lineam inveni ipsius coalitum indicantem, qua in linea duo aut tria parva erant oscula cum iliaca vena communicantia. Quam cum secundum longitudinem incidissem & præter filamenta polyposa quendam fibrarum quasi fasciculum introrsum exstantem conspexissem, innox facile animadverti venæ parietes ab uno latere inter se coaluisse, sicque eum fasciculum mentiri cujus species manu utraque parietes distrahendo, neque enim perdisi cilis erat sejunctio, prorsus evanescebat.”—Vid. Epist. 56. Artic. 10.

† I have had an opportunity also of seeing another instance of obliteration in veins, very similar to what I have described, at the Lyceum Medicum Londinense.

In writing upon this subject, it may be worth while to mention, that I once found a stricture in the femoral artery of an adult subject, just under the origin of the arteria cruralis profunda. There was a contraction of the artery so complete, that at one part the sides were nearly in contact, but, as far as I could judge, without any diseased alteration of structure. This took place where considerable branches are given off, by which the blood could be readily conveyed to the femoral artery, beyond the place of contraction. What could be the cause of this contraction it is not easy to imagine; it certainly did not arise from any mechanical constriction, and therefore would seem to depend upon some action in the coats of the vessel itself.

Let us suppose that an aneurysm had been previously formed in the femoral or popliteal artery of this particular limb, what would have been the consequence? Would this contraction of the artery near the groin prove a natural cure of the aneurysm? There is certainly a great analogy between this natural process of contraction in the artery, and the operation for the aneurysm as lately performed by Mr. Hunter. This, in the operation for the popliteal aneurysm, consists in simply making

an incision upon the femoral artery before it passes through the tendon of the triceps muscle, and taking it up there by a ligature, which promises to be a great improvement in the art of surgery. There is this difference, however, between them, that when a ligature is made upon an artery, the blood is prevented all at once from passing through it, and it takes a very considerable time before the collateral branches enlarge, so as to convey the blood in any quantity to the principal artery: besides, the ligature is made so near the aneurysm, that the enlarged collateral branches communicate principally with others arising beyond it. In the case we have mentioned, the contraction of the artery was probably a gradual process, the collateral branches enlarging in proportion as the contraction increased, so that the same quantity of blood was always circulating in the limb. But still the impetus of the blood must have been greatly diminished by passing through a number of meandering channels, instead of one straight canal; so that if the progress of an aneurysm could not be stopped by it, it would at least advance very slowly; and if an aneurysm had been formed near the seat of the contraction,

traction, it must have been as effectually cured by it as by an operation*.

Of the OSSIFICATION of VESSELS.

THERE is no diseased change of structure more common in the body, than partial ossifications of the arterial system at an advanced period of life. The time of life at which this process begins, and its progress, vary very much in different persons. There is also considerable difference in the sort of change. In some there is a conversion of the coats of an artery into a substance, resembling very much the common bony matter; in others there is a conversion of them into an earthy matter, little blended with the animal gluten. This sort of change is so common, that when a person dies about the age of sixty years, it is more frequently found to have taken place

* There is an instance of this sort of contraction in arteries mentioned by Morgagni.

“ Sed illud peculiare quod si eandem faciem (scil. anteriorem aortæ) inspiceres, tunicæ latus arteriæ sinistrum & posteriorem partem facientes ad angulum inter se jungi, non curvæ instar lineæ videbantur.”—Vid. Lib. v. Epist. 65. Artic. 5.

in a greater or less degree, than that the arterial system possesses its original healthy structure. The venal system, on the contrary, is so rarely liable to this sort of change, that it may be said to be a disease in it almost entirely unknown. There is one instance, however, in the collection of Windmill-street, where a considerable ossification was formed in the coats of the vena cava inferior, near its bifurcation into the two iliacs*. Why there should be this difference in the coats of arteries and veins, is not easy to explain. There seems to be no reason for it *à priori*. It might, perhaps, be said, that it depends on the vasa vasorum being more numerous on the coats of arteries than of veins, but it certainly does not depend upon this circumstance. The vasa vasorum are more numerous on the coats of arteries in younger than in older people, yet in the former ossification scarcely ever takes place.—Besides, it is obvious, that a peculiar effect must depend on a peculiar action, and not simply upon the

* This ossification was found in the same vein which had the extraordinary obliteration we have described in the former part of this paper.

number of vessels *. I do not, therefore, pretend to explain why ossification should be so common an occurrence in the coats of arteries, and so rare in those of veins, but I know it to be a very rare occurrence in the latter, and for this reason I thought it worthy of mentioning, as a singular matter of fact in the history of diseased appearances †.

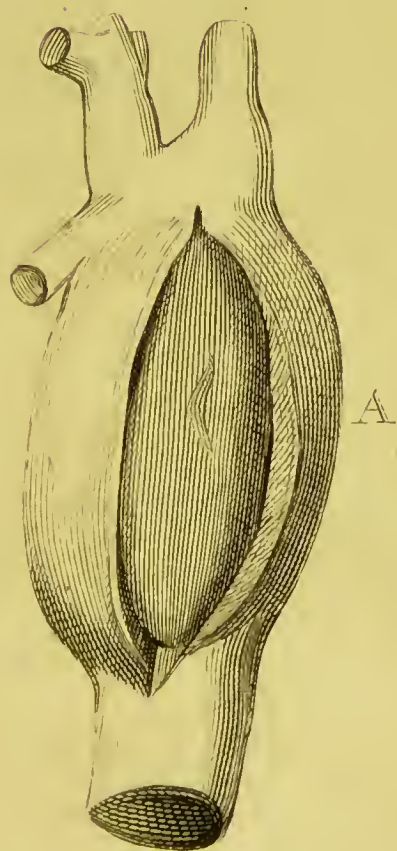
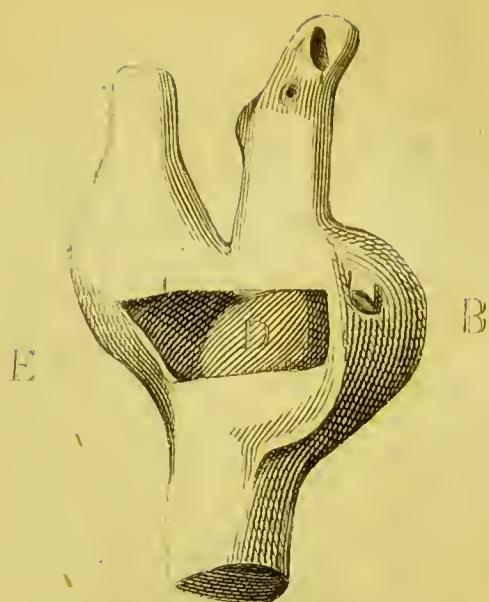
* Bony matter, whether deposited in the coats of arteries or veins, can only be formed by the *vasa vasorum* secreting bony matter in the same manner as it is secreted in the growth of bones generally.

† When ossification takes place in the *valvulæ tricuspidæ*, or *mitrales*, it perhaps may be considered as an ossification belonging to the venal system, but even this is very rare.

P L A T E IV.

A. THE right carotid artery, with its enlargement, of the same size exactly as found in the body, the size being taken by accurate measurement. The tumour is laid open longitudinally, to shew that it is entirely filled with coagulable lymph.

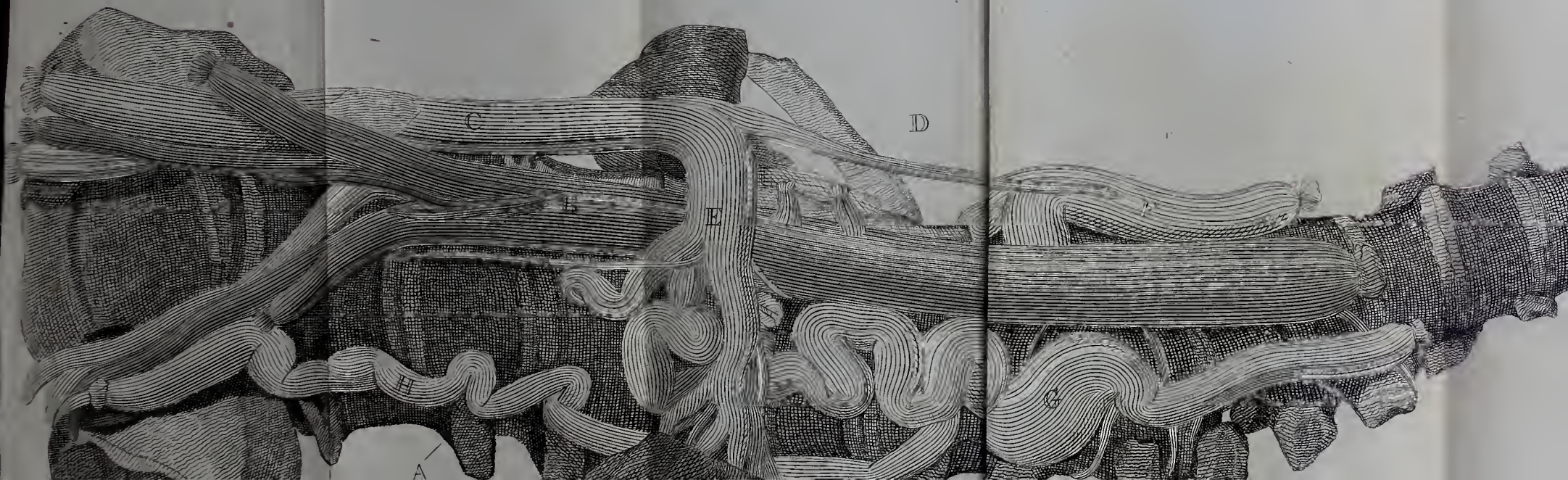
B. The left carotid artery—D representing the quantity of coagulable lymph in it, E representing the proportion of cavity for carrying on the circulation.







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P L A T E V.

F I G. I.

- AA. Spine.
- BB. Aorta, with the iliac branches.
- C. The vena cava inferior, with a white ossified part, more fully shewn in Fig. 2.
- D. The obliterated portion of the vein.
- E. Left emulgent vein enlarged.
- F. The vena azygos considerably enlarged beyond its usual size.
- G. An uncommon vena azygos of the left side, very much enlarged and tortuous.
- H. Veins of communication between the left iliac vein and left vena azygos.—They are enlarged and tortuous.
- II. The two kidneys dried and shrunk.

F I G. II.

- AA. A portion of vena cava inferior.
- B. Represents the size, shape and irregularity of the ossified part.

N. B. Both of those drawings were taken from a dried preparation long after it was made.

IX. *An Account of Mr. HUNTER's Method of performing the Operation for the Cure of the Popliteal Aneurism.* By EVERARD HOME, Esq; F.R.S. *Assistant-Surgeon to St. George's Hospital.*

THE popliteal aneurysm being a disease which frequently occurs, and generally proves fatal, unless some means are taken to prevent it; we cannot be surprized that it has attracted the attention, and called forth the exertions of the ablest surgeons in this country to discover some method of cure.

Experience has shown that all the modes hitherto practised are exceedingly precarious, being rarely attended with success, and the death of the patient being commonly a consequence of a failure of the operation; a circumstance which has led some surgeons of great eminence to prefer the amputation of the limb in all such cases.

Mr. Hunter, who has repeatedly performed the operation for the aneurysm, finding that it in general fails, and having likewise observed that the removal of a limb so high up,
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from a person in health, seldom succeeds in preserving life, (and when it does, leaves the patient disabled,) was excited to consider this disease with more than ordinary attention. The result has been a mode of practice that appears to possess many advantages over those hitherto recommended, and to be an improvement in the practical part of surgery; at least it is from this idea being strongly impressed on my mind that I am induced to communicate it to this Society, as Mr. Hunter is too much engaged to permit his taking that task upon himself.

An aneurysm is a preternatural dilatation of a portion of an artery, and in general it is a very small part of the arterial coats which is thus affected. The dilatation is commonly on one side only, and, when once begun, gradually enlarges, from the force of the heart propelling the blood against the dilated part. Thus in time a sac is formed, which being in some measure out of the direct course of the circulation, the blood, where it is at the greatest distance from the channel of the artery, coagulates, and forms layers, or strata, upon the inside of this sac. As the enlargement of the sac depends intirely on the force
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with which the blood is acted on by the heart, it does not, as at first, continue to swell out at right angles from the side of the artery, but is increased in a diagonal line between that and the course of the artery itself, from the force of the blood being applied in that direction; so that the sac is protruded along the outside of the artery, and, by its pressure upon it, obliterates, in many instances, the lower orifice, which communicates with the artery, and produces a total stagnation of the blood in the sac.

If the coats of an artery are examined in the commencement of this disease, the first appearance is a loss of the natural lustre and transparency of its internal membrane; that becoming opaque, afterwards thicker, acquiring a leather-like appearance; and when the sac becomes larger, the coats retain no longer a resemblance to those of an artery, but have more that of a membranous bag, communicating laterally with the artery by a rounded orifice, (of different sizes,) the margin of which resembles the internal membrane of an artery, in a thickened state; but beyond that, gradually degenerates into a membranous substance.

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The popliteal aneurysm, which we are at present to consider, is the disease above mentioned, affecting the trunk of the popliteal artery, which runs down between the two ham-strings of the thigh. From the situation of the tumor, on whatever side of the artery the dilatation is produced, it will be distinctly felt in the hollow between the ham-strings, and will be readily ascertained by a pulsation to be felt in every part of the tumor; it seems to be one of the most frequent situations of aneurysm; and though it may be difficult to ascertain whether it occurs so commonly as in the aorta itself, it is certainly found oftener in this artery, than in any other branch which the aorta sends off. This circumstance, as far as I know, has not hitherto been accounted for, and what is rather curious, in many recent instances of this disease, the patients have been coachmen and postilions *. The popliteal aneurysm has been in
general

* Morgagni and his friends found aneurysms of the aorta more frequently in guides, post-boys, and other persons who sit almost continually on horseback, which is attributed to the concussion and agitation.—Vide Letter xvii. Art. 18.

When we consider the popliteal artery as affected by the different positions of the leg and thigh, and the obstruction which
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general supposed to arise from a weakness in the coats of the artery, independent of the presence of disease; if this were true, we might reasonably conclude, that, except in the part preternaturally dilated, the vessel remained in a sound state, which would naturally suggest the mode of practice generally recommended, viz. opening the sac, tying

the circulation must inevitably meet with in that artery, when the limb is bent, we see a probable reason why it should be more liable to disease than any of the other ramifications of the aorta; especially when it is found that aneurysms in the aorta itself are most frequent at the curve of that artery.

If this observation is allowed to have any weight, the reason will be evident why the disease should occur more frequently in coachmen and postilions; for their knees being almost constantly in a bent state, from the necessary exertions of their bodies in their different occupations, and from the violent motion of their horses and carriages, the circulation must often be considerably increased; while the branches immediately below the popliteal artery will be in some measure obstructed by the action of the gastrocnemii and solæi muscles, in standing the body in the stirrup, or against the foot-board of the carriage.

The unfavourable circumstances respecting the popliteal artery, do not in common life seem of themselves capable of producing disease, but when increased to a great degree, as in the occupations of coachmen and postilions: They, at the same time, from want of sufficient exercise, have their legs weaker and less healthy than the rest of the body; and the cases to be mentioned appear still further to prove, that these circumstances may produce such a state of the artery at this part, as to dispose to the formation of aneurysm.

up the artery above and below it, leaving the bag to suppurate, and afterwards heal up like any common sore.

Mr. Hunter finding an alteration of structure in the coats of the artery previous to its dilatation, and that the artery immediately above the sac seldom unites when tied up in the operation for the aneurysm, so that as soon as the ligature comes away, the secondary bleeding destroys the patient, was led to conclude, that a previous disease took place in the coats of the artery, in consequence of which it admitted of dilatation capable of producing aneurysm. But not satisfied with the experiments on frogs, given by Haller in support of the opinion that weakness alone was sufficient to produce the dilatation, he resolved to try the result in a quadruped, which, from the vessels being very similar in their structure to those of the human subject, would be more likely to ascertain the truth or fallacy of Haller's opinion. That the experiment might have as much as possible the chances most likely to produce aneurysm, the carotid artery, as being near the heart, was selected for that purpose.

Mr.

Mr. Hunter having laid bare the carotid artery of a dog, for above an inch in length, having removed its external coat, and afterwards dissected off the other coats, layer after layer, till what remained was so thin that the blood was plainly to be seen through it, left the dog to himself.

In about three weeks the dog was killed, and the parts examined, when it appeared that the two sides of the wound having closed upon the artery, the whole of the surrounding parts were consolidated, forming a strong bond of union, and the artery itself was neither increased nor diminished in size.

This experiment appeared very conclusive, as the coats of the artery were weakened to a much greater degree, without dilatation, than can ever happen from accident in the living body, independent of morbid affection: but it was objected, on the other hand, that the parts having been left to themselves, immediately closed upon the weakened portion of the artery, and, being cemented together by the coagulated blood, effectually secured it against any dilatation. To try the force of this objection, I made the following experiment.

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I laid bare the femoral artery of a dog, about two inches below Poupart's ligament, for about an inch in length, and dissected off the coats, till the hæmorrhage from the vasa vasorum was considerable, and the circulating blood was distinctly seen through the internal membrane of the artery. The hæmorrhage soon stopped by exposure, the surface was wiped dry, and afterwards covered with a dossil of lint, to prevent the sides of the wound from uniting. The dog continued very well, and the wound healed up from the bottom; after six weeks the dog was killed, and the artery was injected, that it might be examined with greater accuracy. It was not perceptibly enlarged or diminished, and its coats at this part had recovered their natural thickness and appearance.

The results of these experiments confirmed Mr. Hunter in his opinion, that the artery, in cases of aneurism, is in a diseased state; and led him to believe, that the disease often extends along the artery for some way from the sac; and that the cause of failure in the common operation, arises from tying a diseased artery, which is incapable of union, in the

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time

time necessary for the separating of the ligature.

The femoral and popliteal arteries are portions of the same trunk, presenting themselves on different sides of the thigh, and are readily come at in either situation ; but where the artery is passing from the one side to the other, it is more buried in the surrounding parts, and cannot be exposed without some difficulty.

In performing the operation for the popliteal aneurism, especially when the tumor is large, the ligature is commonly applied on the artery at that part where it emerges from the muscles. This mode of performing the operation will be found inadequate, if the disease of the artery extends above the sac ; for if the artery should afterwards give way, there will not be a sufficient length of vessel remaining, to allow of its being again secured in the ham. To follow the artery up through the insertion of the triceps muscle, to get at a portion of it where it is found, becomes a very disagreeable part of the operation ; and to make an incision upon the fore-part of the thigh, to get at and secure the femoral artery,

tery, would be breaking new ground ; a thing to be avoided, if possible, in all operations.

Mr. Hunter, from having made these observations, was led to propose, that in this operation the artery should be taken up in the anterior part of the thigh, at some distance from the diseased part, so as to diminish the risk of hæmorrhage, and admit of the artery being more readily secured, should any such accident happen. The force of the circulation being thus taken taken off from the aneurismal sac, the progress of the disease would be stopped ; and he thought it probable, that if the parts were left to themselves, the sac, with its contents, might be absorbed, and the whole of the tumour removed ; which would render any opening into the sac unnecessary.

Upon this principle, Mr. Hunter performed the operation at St. George's Hospital.

The patient was a coachman, forty-five years of age ; he was admitted into the hospital in December 1785, with a popliteal aneurism, which he had first perceived three years previous to his admission, and had observed it gradually to increase during the whole of that period. It was so large as to distend the

two ham-strings laterally, and make a very considerable rising between them; the pulsation was very distinct, and to be felt on every side of the tumor. The leg and foot of that side were so swelled as to be much thicker than the other, and were of a mottled brown colour; the swelling was not of the œdematous kind, but felt firm and brawny, probably from the extravasation of coagulable lymph; the leg retained its natural shape, excepting that it was larger. Previous to performing the operation, a tourniquet was applied upon the upper part of the thigh, but not tightened, that the parts might be left as much in their natural situation as possible.

The operation was begun by making an incision on the anterior and inner part of the thigh, rather below its middle, which incision was continued obliquely across the inner edge of the sartorius muscle, and made large, to give room for the better performing of whatever might be thought necessary in the course of the operation. The fascia which covers the artery was then laid bare about three inches in length, after which the artery itself was plainly felt. A slight incision, about an inch long, was then made through this fascia,

along the side of the vessel, and the fascia dissected off; by this means the artery was exposed. Having disengaged the artery from its lateral connections by the knife, and from the other adhering parts by the help of a thin spatula, a double ligature was passed behind it, by means of an eyed probe. The doubling of the ligature brought through by the probe, was cut so as to form two separate ligatures. The artery was now tied by both these ligatures, but so slightly, as only to compress the sides together. A similar application of ligature was made a little lower. The reason for having four ligatures, was to compress such a length of artery as might make up for the want of tightness, it being wished to avoid great pressure on the vessel at any one part. The ends of the ligatures were carried directly out at the wound, the sides of which were now brought together, and supported by sticking plaister and a linen roller, that they might unite by the first intention.

The limb was found, some hours after the operation, not only to retain its natural heat, but even to be warmer than the other leg. The second day after the operation, the brawny firmness of the leg was considerably diminish-

ed, it was become soft, loose, and a good deal smaller, and the aneurismal tumor had lost more than one third of its size.

Nothing could shew more plainly the action of the absorbents, than the change the leg had undergone in so short a time; the diminution of the tumor probably arising from the fluid blood which it contained having passed into collateral branches, or into the tibial artery.

The fourth day, on the removal of the dressings, the edges of the wound were found united through its whole length, excepting where prevented by the ligatures; there was neither pain nor tumefaction in the part; but the aneurismal tumour was the same as on the second day.

On the ninth day after the operation, there was a considerable discharge of blood from the part where the ligatures passed out; a tournequet was therefore applied on the artery above, which stopped the bleeding; and, although the tournequet was taken off a few hours after, no blood followed. The head of a roller was then placed upon the wound, in the direction of the artery, and over that the tournequet, which

was

was not, however, tightened more than was thought sufficient to take off the impetus of the blood in that portion of the artery.

On the tenth day appearances were much the same, only that between the compress and the knee there appeared a little fullness, like beginning inflammation. On the eleventh day this was gone off, and on the fifteenth some of the ligatures came away, followed by a small discharge of matter, the tumor in the ham being lessened. On the seventeenth day the parts surrounding the aneurismal tumor were more reduced, and pliable, so that it was distinctly to be felt.

About the latter end of January, 1786, six weeks after the operation, the patient went out of the hospital, the tumor at that time being somewhat lessened, and rather firmer to the feel. He was ordered to come to the hospital once every week, and, in the mean time, to make some degree of pressure, by application of a compress and bandage, with a view to excite the absorbents to action, which in most cases has a good effect.

About the middle of February the tumor had decreased, and was become still firmer. March the 8th, the wound, which had cica-

trized, broke out again, and the patient was taken into the hospital. About the 8th of April, some of the remaining thread of the ligature came away, and an inflammation appeared upon the upper part of the thigh. In the middle of May, a small abscess broke at some distance from the old cicatrix, at which opening some matter was discharged, but no pieces of ligature were observed. Several small threads were, at different times, discharged from the old sore, and the swelling subsided; but the thigh soon swelled again to a greater size than before, attended with considerable pain. In the beginning of July, a piece of ligature, about one inch in length, came away, after which the swelling went off intirely, and he left the hospital the 8th of July, at which time there remained no appearance of tumor in the ham, he being in every respect well.

After leaving the hospital, the man returned to his usual occupation of driving a hackney-coach; and being, from the nature of his employment, much exposed to cold, in March 1787 he was seized with a fever of the remittent kind, which carried him off. He had not made any complaint of the limb on which

which the operation had been performed, from the time of his leaving the hospital.

He died on the 1st of April, 1787, fifteen months after the operation; and leave was procured, with some trouble and considerable expence, to examine the limb, seven days after death, at which time it was intirely free from putrefaction.

The cicatrix on the anterior part of the thigh was scarcely discernible, but the parts under it felt hard. The ham had no appearance of tumor, and was to the eye exactly like that of the other limb; there was, however, a solid tumor perceptible to the touch, filling up the hollow between the two angles of the thigh-bone.

The femoral artery and vein were taken out above the giving off the branch called profunda, and a little below the division into the arteriæ tibiales and interossea. The arteries and veins that were pervious being injected, the whole was carefully dissected.

The femoral artery was impervious from its giving off the arteria profunda as low as the part included in the ligature, and at that part there was an ossification for about an inch and an half along the course of the artery,
of

of an oval form, the rim of which was solid, becoming thinner towards the center, and not bony, but ligamentous. Below this part, the femoral artery was pervious down to the aneurifmal fac, and contained blood, but did not communicate with the fac itself, having become impervious just at the entrance.

What remained of the aneurifmal fac was somewhat larger than an hen's egg, but more oblong, and a little flattened, extending along the artery below for some way; the blood pressing with greater force in that direction, and distending that part so, as in some measure, to give the appearance of a separate bag. The sac was perfectly circumscribed, not having the smallest remains of the lower orifice into the popliteal artery; whether this arose from the artery being pressed upon by the inferior portion of the sac, as appears to be the case in common, or was in consequence of the sac contracting after the operation, I will not pretend to determine; but it contained a solid coagulum of blood, which adhered to its internal surface. A section made of this coagulum, appeared to be composed of concentric lamellæ, uniform in colour and consistence.

The

The popliteal artery, a little way below the aneurismal sac, was joined by a small branch, very much contracted, which must have arisen either from the profunda, or the trunk of the femoral artery. About two inches below the sac, the popliteal gave off, or divided into the tibiales.

The profunda was of the usual size, but a good deal ossified, for some length after leaving the femoral artery; the two tibials, where they go off from the popliteal, were in the same state.

The trunk of the femoral vein, where it passed along the side of the tumor, must have been obliterated; for at this part it appeared to send off three equal-sized branches, passing over different parts of the aneurismal sac: these must have been dilated branches, none of them having the course which the trunk of the vein should have pursued.

These appearances throw some light upon the changes which took place in the limb after the operation. The ligature upon the femoral artery impeded the passage of the blood into the sac so much, as to allow its contents to coagulate, and render the opening into it from the artery impervious. By this
a stop

a stop was only put to the increase of the tumor, its reduction to the size met with in the dead body, must have been the effect of absorption.

The conclusion to be drawn from the above account, appears a very important one, viz. that simply taking off the force of the circulation from the aneurismal artery, is sufficient to effect a cure of the disease, or at least to put a stop to its progress, and leave the parts in a situation from which the actions of the animal œconomy are capable of restoring them to a natural state.

In confirmation of the cure of aneurism depending on taking off the force of the circulation, I shall mention a case of aneurism that recovered without an operation; and in which the mode of recovery depended upon the same principle.

The aneurism was in the femoral artery, and the swelling appeared upon the anterior part of the thigh, a little above the middle, extending upwards nearly to Poupart's ligament; an attempt was made, by compressing the artery above the tumor, by means of an instrument somewhat resembling a steel truss, to give the blood in the sac a chance of coagulating,

agulating, and by that means to put a stop to the progress of the disease. But, from the pain which it occasioned, every attempt to make a permanent compression on the artery proved ineffectual. The tumor increased to a very considerable size, a great degree of inflammation and swelling took place in the sac and common integuments, and mortification appeared to be coming on the skin. While in this state, no pulsation could be felt in the tumor; or the artery immediately above it; so that the steps preceding mortification had taken place *, which put a stop to the dilatation of the sac, and all its consequences. From the time the pulsation in the sac stopped, the inflammation and swelling subsided, although very slowly; and as the tumor diminished it became firm and solid, and the patient got perfectly well.

It appears from these cases, that surgeons have laid too much stress upon the supposed necessity of large collateral branches, to in-

* On examining the bodies of those who die in consequence of mortifications, the artery leading to the mortified part is completely stopped up with a firm coagulum for several inches in length; this must precede the mortification, and seems intended to prevent hæmorrhage.

From Mr. Hunter's Lectures.

sure the success of this operation ; an opinion which must have arisen from anatomical knowledge, rather than observations made from practice.

The second time Mr. Hunter performed this operation, was upon a trooper about forty years of age.

A tourniquet having been loosely applied upon the thigh, the operation was begun by a longitudinal incision through the integuments, and the artery and vein were exposed, as in the former case, but not taken up with a number of ligatures, for nothing appeared to have been gained by such practice, and the bad effects of it were obvious in the progress of the cure ; they were included in one strong ligature, sufficiently tight to prevent the pulsation in the sac, without injuring the coats of the vessels. The ends of the ligature were brought out at the wound, which was in this case dressed from the bottom. The advantages proposed by this treatment were, to be able to see the progress of the cure, and to come readily at the artery, if any unfavourable circumstance occurred ; since the abscesses in the former case were suspected to have arisen from the mode of healing.

After

After the operation, the superficial veins of the leg became exceedingly turgid and numerous, and the limb, although warm, became rather less so than the other, particularly the foot.

The next day the leg was swelled, and the heat 12° lower than the other; the second day it exceeded the other 5° ; and on the fourth day the two limbs were equally warm; the patient was free from fever.

On the fourteenth day the ligature came away, and the tourniquet was loosely applied, as a precaution against bleeding; the sartorius muscle was a good deal enlarged, and covered the passage down to the artery, so as to prevent the matter from having a free discharge; a good deal being confined behind it, and with difficulty squeezed out at each dressing.

On the nineteenth day there was an hæmorrhage from behind the muscle, the swelling of which rendered it nearly as difficult to come at the vessel, as if the parts had healed by the first intention; the bleeding was stopped by applying pressure, after having lost about ten or twelve ounces.

On

On the twentieth there was a slight bleeding, which was readily stopped: yet five hours afterwards the femoral artery gave way, and he lost about one pound of blood before the tourniquet was applied. The artery was laid bare, and tied a little higher up, the patient being very weak and low; in this state he continued till the twenty-third day without bleeding, when it bled again from a small vessel. On the twenty-sixth a considerable hæmorrhage having taken place, he became faint, then delirious, had vomiting with hic-cough, and died the same day.

Upon examining the limb, sinuses were discovered both upwards and downwards, in the direction of the artery and sartorius muscle, besides smaller ones in different directions.

In this case, the bad consequences and death of the patient, do not appear to have arisen from the operation, but were intirely the result of the mode of treatment afterwards, as will appear from the following cases.

The third patient operated upon by Mr. Hunter was a postillion, thirty-five years old. Compression upon the femoral artery was attempted, but the pain was so great that it could not be continued.

In

In performing the operation only one ligature was used, and the parts healed by the first intention.

On the seventh day after the operation, the first dressings were removed, and a good deal of matter came out by the side of the ligature. On the fourteenth the ligature came away, and in four weeks the wound healed.

The sac in the ham, from being chafed previous to the operation, burst at this time, but healed up like any other sore, and at the end of three months he was perfectly recovered.

Mr. Hunter's fourth patient was a coachman, thirty-six years old.

The tumor in the ham was not very large, and situated lower down than usual, the whole leg being swelled, and the veins turgid. The pain he complained of was exceedingly violent, but being in a very bad state of health, an operation was not thought adviseable, and gentle pressure on the tumor was attempted; but, from the pain it occasioned, the operation was had recourse to, as the only chance of saving his life, although, from the irritable state in which he then was, even that seemed a forlorn hope.

In performing the operation, the vein was not included in the ligature, but in other respects it was similar to the former.

Immediately after the operation the limb was benumbed, and continued so for some time, which was singular, as the nerve had not been included. It became, on the same day, four or five degrees hotter than the other leg, and continued so for the first fourteen days, when the temperature became the same as that of the other limb.

The sixth day the first dressings were removed, and the skin was united every where except at the passage of the ligature. It remained in this state till the twenty-first, when the cicatrix inflamed and ulcerated, with a sloughy appearance, and hardness up the thigh.

On the twenty-ninth day the ligature came away; the fore now put on a better appearance, suppuration took place where the hardness had been in the course of the artery, and the parts became softer, the discharge gradually diminished, and in the seventh week the wound was healed.

But it did not continue so; for in three days an inflammation took place, and an abscess

scabs formed, and burst at the cicatrix, which also healed up.

About the end of the tenth week he was attacked with a very severe remitting fever, which lasted fourteen days, and left him much reduced; but in the fourteenth week he was so far recovered, as to leave the hospital and go into the country, for the recovery of his health.

The fifth patient upon whom Mr. Hunter performed this operation was Joseph Caswell, aged forty-two, a man not accustomed to horse exercise, or any mode of life which could in the least assist in producing the disease. The aneurism was in the ham of the left leg.

In performing the operation, the artery alone was included in a strong single ligature, and the wound was healed by the first intention, leaving a passage for the ligature. The local inflammation was extremely small, and consequently attended with little sympathetic fever. The ligature came away the eleventh day, and in five weeks he went into the country, able to walk with a stick, the wound perfectly healed.

In this case the heat of the two legs was carefully examined twice a day, from the second to the ninth after the operation, and the limb operated upon was uniformly colder than the other.

He came to town six months after the operation, and said that the left leg was fully as strong as the right, but, when exposed to cold, he was more sensible of its effects upon that leg. About two months after the operation he had a violent pain in the upper part of the left foot, similar to what is felt when a nerve is pressed; this lasted for about six weeks, and afterwards went entirely off. As no nerve was included in the ligature, this affection probably arose from the nerve in its passage through the consolidated parts being deprived of its natural freedom. There was a small tumor, the remains of the aneurismal sac, very distinctly to be felt in the ham, but without pulsation, and to the feel perfectly solid.

The following case was operated upon by Mr. Lynn, surgeon of the Westminster Hospital, in the same manner as abovementioned; and the account of the operation is given in his own words.

“ Samuel

“ Samuel Smart, an hackney coachman, twenty-five years of age, had a popliteal aneurism, for which I performed the operation in the following manner. I made an incision down to the femoral artery, a little below the middle of the thigh, and having separated the artery from the contiguous parts, I passed under it, by means of an eyed probe, a broad ligature, which was tied so as to cut off all communication with the tumor, and the lips of the wound were brought together, and retained by sticking plaister, and the patient put to bed; this leg was rather colder than the other, and ordered to be fomented. The next day he was free from pain, and the limb was warmer than the other.

“ On the fourth the dressings were removed, and the parts were found united, except at the ligature.

“ On the thirteenth the ligature came away, and in the course of the month the whole was healed, and the patient soon afterwards perfectly recovered.

WM. LYNN.”

This operation of Mr. Hunter's having succeeded in the first instance, surgeons of

different hospitals were led to adopt it, but with some variation, according to their own judgment, and the circumstances of the respective cases. These I did not introduce in the order in which they took place; for not being performed exactly in the same manner, they would have interrupted the regular series of those cases above related. But I shall now give them either in the words of the surgeons who performed the operations, or as correctly as I can from having myself been an eye-witness; and although they were not attended with success, that circumstance will not be found to affect the propriety of the mode of performing this operation which has been recommended above.

In a case of aneurism of the femoral artery, the operation was performed by Mr. Birch, surgeon to St. Thomas's Hospital, who relates the history as follows:

“ John Lewis, a negro, aged forty-three, received a blow on the anterior part of the right thigh; about a month after he perceived a small tumor, which gradually increased, and his own expression was, that he could feel it thump, thump.

As

As the tumor enlarged, he came to London for advice, applied at St. Thomas's Hospital, on Thursday, the 26th of October, and was directly admitted. On examination I found a large tumor, extending within two inches of Poupart's ligature upwards, and occupying two-thirds of the thigh; a pulsation could be felt, and there was no doubt of the disease being an aneurism of the femoral artery.

I directed seven-ounces of blood to be taken from the arm, and an opiate to be given at night; the patient rested well, and the next day a consultation was held, in which it was proposed to perform an operation, and endeavour to pass a ligature round the femoral artery, giving the patient the chance of nourishing the limb by the arteria profunda, and other anastomosing vessels.

On Friday, the 3d of November, it was determined to perform the operation; Mr. Cline undertook to compress the artery as it passes through Poupart's ligament, which he easily effected with a hard compress, in the shape of a T, with a broad basis.

It was agreed, previous to the operation, that an incision should be carried in a semi-lunar form round the upper part of the aneu-

risimal sac, in order to make room for the longitudinal incision necessary to dissect down to the artery; this was accordingly done, and the integuments raised, so as to make room to feel for the pulsation of the artery; some portion of cellular membrane and lymphatic glands were necessarily dissected and removed: with my fingers I then separated the muscular fibres, and tore away the connecting parts till the artery could be plainly felt in pulsation; it was then necessary to divide a part of the fascia covering the artery, which was done by carrying the back of the knife on Mr. Cline's nail, while his finger pressed upon the naked artery; after which the finger and thumb could surround and compress the vessel; an eye probe, armed with a strong flat ligature, was then pushed through the cellular membrane, and carried under the artery. This being effected, we had such command of the vessel as to be able to strip it down, and pass another ligature somewhat lower. This last ligature was then tied, the first being left loose, to secure us against accident.

The threads being separated and secured, the wound was lightly dressed, the tumor left in its natural situation, and the patient put to bed,

bed, with the loss of only four or five ounces of blood during the operation. No pulsation could be perceived in the tumor after the ligature was tied.

On Saturday, November the 4th, he had slept well, was easy, and there was sufficient warmth in the extremity to assure me of some circulation. On the 5th the discharge from the wounded lymphatics was so abundant, as to make it necessary to remove the superficial dressings; the tumor was rather softer to the touch, and the skin about the apex of it began to shrivel.

The discharge of lymph continued till the 9th, and then the wound began to digest, affording, however, a very small quantity of pus. The tumor grew thinner at one point, and seemed as if disposed to ulcerate the integuments. This day I passed a bleeding ligature round the leg, just below the knee, and the veins tumified sufficiently to have bled freely if they had been punctured.

10th. He was feverish in the evening.

11th. He had stools from some laxatives I had directed, and was better.

12th. The tumor was very thin at one part, and a fluctuation evidently to be felt.

The

The limb was warm and moveable, but the patient was feverish, and delirious at night; a decoction of bark, with a sedative bolus, was directed for him, but he would not take them.

13th. The wound looked florid, and afforded good pus, the patient was feverish and delirious; the tumor was threatening to burst. This day he took his medicines.

14th. He became sensible, but was languid and hot; the tumor burst, and discharged serum and grumous blood; he fainted; the dressings were not disturbed; he slept composedly; fainted again about six o'clock in the evening, and expired. I saw him at seven, when the limb was still warm; I removed the dressings, and found a small stream of fresh arterial blood which had issued from the wound.

It appears probable that if the patient had applied for relief before the tumor was so much enlarged, the operation might have succeeded, as we should then have been able to have tied the found artery so much lower down.

J. BIRCH.

The

The body was examined the morning after the patient's death by Mr. Cline.

The integuments on the middle of the tumor were mortified. The blood contained in the tumor was very putrid, and the greater part of it fluid, it appearing to have been dissolved by putrefaction.

Water injected by the external iliac artery, escaped freely from the wound at the ligature where the artery was open, and appeared to have ulcerated at that part.

In laying open the artery from the ligature to the heart, its internal surface appeared of a bright red. This appearance lessened at the curvature of the aorta, yet it was very evident in its femilunar valves.

The arteria profunda, which passed off from the femoral artery rather less than half an inch above the ligature, was also inflamed within. There were near two inches of the femoral artery between the ligature and the aneurysmal sac, the internal surface of which was of the usual white colour; from this a membranous-like substance could be peeled off that seemed to resemble coagulable lymph.

The opening where the artery passed out of the aneurysmal sac was near three inches
below

below the part where it entered. In opening this part of the artery from the sac to the ham it appeared quite sound, and of its natural colour.

H. CLINE.

This mode of operating was adopted by Mr. Pott in a case of popliteal aneurysm in St. Bartholomew's Hospital; which operation having been the object of medical attention for some time, I shall give a brief account of it, as I was present at the time it was performed.

Mr. Pott began the operation by making an incision, about five inches in length, upon the posterior part of the thigh, through the common integuments, a little higher than the tumor, and in the direction of the thigh, between the two ham-strings; he then dissected down to the vessels at the upper end of the incision, which being there deep seated, proved both tedious and difficult. Having come to the vessels, a double ligature was passed, and the two portions tied separately, at nearly half an inch distance. The depth of the incision made it difficult for any but the operator, and those immediately assisting him, to see what was included in the
ligature,

ligature, and at the time the popliteal artery was supposed to be secured by it. The wound was dressed up in the common way.

The second day after the operation, a pulsation was felt in the tumor, which afterwards enlarged so much that Mr. Pott amputated the limb.

It is said, that the aneurysm appeared, upon an examination of the limb, to have been in an anastomosing branch, not in the trunk of the artery.

The following remarks upon this operation will tend in some measure to illustrate the method recommended and practised by Mr. Hunter.

The mode of taking up the artery in the ham must be always unfavourable to the future success of the operation, if either the artery itself should be diseased, or if the tumor, by being so contiguous to the violence done in the operation, should be affected by the consequent inflammation; which seems to have been the case in Mr. Pott's operation, as I understand two abscesses were formed close to the sides of the sac.

Had the aneurysm been situated in an anastomosing branch of the popliteal artery, given

off below the ligature, there should have been no pulsation afterwards in the tumor; and were it in a branch going off above the ligature, the pulsation in the tumor should have continued immediately after the operation, and should have been increased by it; neither of which effects appear really to have taken place, which throws a doubt upon the situation of the aneurysm, if the popliteal artery was rendered impervious by the compression of the ligature.

Mr. Cline, Surgeon to St. Thomas's Hospital, performed the operation for the popliteal aneurysm in the following manner, at which I was present; and although not exactly as recommended by Mr. Hunter, it was very nearly so. The particulars of the case I have not received from Mr. Cline, but have taken them from my own observation, and the information of gentlemen who attended the patient, and were present at the examination after death.

The patient was a sailor, who came into St. Thomas's Hospital to undergo the operation for the popliteal aneurysm.

Mr. Cline made a longitudinal incision on the anterior part of the thigh, and having
laid

laid bare the artery, passed, by means of a tin instrument, a double tape, about one inch broad, behind the artery, the two pieces of tape lying one over the other; the piece of tin which conducted the tape was cut off, and a cork, nearly an inch long, was laid upon the artery, and confined to its situation by means of the upper tape, producing in this way a sufficient pressure upon the vessel included between the ligature and cork to stop the circulation, and consequently the pulsation in the tumor in the ham; the other portion of tape was left loose. The intention of securing the artery in this way, was to compress the sides of the vessel together, and produce an union without ulceration.

The patient went on very well, and the ninth day the tapes were removed, and every thing seemed to be going on very favourably, when the patient was attacked by a fever, (which was supposed to be caught from another patient in the same ward) of which he died.

Upon examining the state of the limb after death, it was found that ulceration had taken place through the whole extent of the artery included in the tape; and sinuses were formed

both upwards and downwards, in the course of the thigh, to some distance.

I cannot conclude this paper without observing, that it is seldom in giving an account of a new operation, we are able to collect materials sufficient to render it so satisfactory as the present, having in our possession not only the successful and unsuccessful cases, but also an account of the appearances after death, under both circumstances, so that the causes of failure are rendered evident in those instances in which it did not succeed, and the means that are likely to insure future success are clearly pointed out.

The operation is in itself simple; it requires but a short time in the performance, and produces little, if any, affection of the constitution; but its advantages are more clearly seen by contrasting it with the common mode of operating for the popliteal aneurysm. This is by exposing the sac in the ham through its whole extent, laying it open, scooping out the blood, searching for the two orifices leading into it, and taking up the artery with a ligature both above and below the sac. When this operation is over, there remains a large deep-seated sore, composed of
parts

parts not perfectly in a natural state, and in a most disadvantageous situation; which fore is to suppurate, granulate, and heal; a process that is not soon performed, and which must leave a stiff knee for some time afterwards. Yet this is considering the operation in the most favourable view, since there is always a risk, from the artery being diseased so close to the sac, of the patient dying from a secondary bleeding; and when that does not happen, there is still some danger of not being able to support the constitution during the healing of a large sore, under circumstances so very unfavourable.

It is in comparison with this operation, the only one before in use, that the present improvement is to be considered, and it is in this view that I have thought it deserving the attention of the Society.

I cannot close this account without inserting the following case, in addition to those already stated, in favour of this operation. I have received it just time enough to give it a place, as the paper was in the press before it came to hand, and feel myself obliged to Mr. Earle for his readiness in communicating it.

Hanover-Square, March 10, 1792.

SIR,

AT your request I send you some account of the following case, and am

Your most obedient Servant,

JAMES EARLE.

JOHN SMITH, about fifty years of age, was received into St. Bartholomew's Hospital on account of a fever. After having been under the care of the physician some time, he complained of a swelling and pain in his left leg, for which I was desired to visit him. He said, about six months before, he had fallen from a scaffold; that his leg was caught between the rounds of a ladder, which broke his fall; that he felt immediately pain in the upper part of his leg; soon after it began to swell, and had gradually increased to its present size. On examination there appeared a large hard swelling under the heads of the gastrocnemii muscles, reaching up to the bend of the leg. A pulsation was plainly to be felt in it, and there was no doubt of its being an aneurysm. It was now increasing very fast in size; the tumor, by its pressure, caused

caused exquisite pain, all the lower part of the leg was loaded with œdematous swelling, and it became absolutely necessary to perform some operation to prevent a mortification taking place.

Having noticed with much satisfaction the success which attended Mr. Hunter's method of tying the artery in the thigh, in a similar case, I decided in favour of that operation; but as, in the present instance, the artery appeared to be in its natural and perfect state in the ham, and in its whole course, till it reached the dilatation below the knee, I preferred taking it up in that part, rather than to tie it in the middle of the thigh, under the sartorius muscle; though it lies there more superficial, and more easily to be got at; because I thought the chance of the circulation being carried on was equal, if not greater, and if it should fail, and symptoms should occur to create a suspicion of an impending mortification, there might be an opportunity of removing the limb above the ligature, which would be impracticable if the artery was tied in the middle of the thigh.

Jan. 28, 1792. The patient being laid on his face, and the tourniquet loosely applied,

I made an incision about five inches long, in the direction of the artery, within those tendons which compose the inner ham-string. I then gradually separated the cellular substance; in doing this the nerve was exposed, which ran in its usual course, external to the artery, and much more superficial. In finding the artery, some difficulty occurred on account of the tumefaction of all the parts, affected by their vicinity to the aneurysm; and from the imperceptibility of pulsation in the artery till it was actually laid bare: however, having discovered it in its usual situation near the bone, and in its natural undilated state, I passed a ligature round it, about two inches above the tumor. I now again examined, and being convinced that the artery was included alone in the ligature, I gradually made it tight, till I felt a pulsation above it, and none below, when I desisted, concluding that any pressure beyond this degree would be useless and dangerous.

I will just observe here, that I found the common aneurysmal needle with a handle very inconvenient, and would recommend in this case, where the artery lies so deep, a

blunt semicircular needle, with the eye about half an inch from the end, without any handle.

The wound was closed in the usual manner, and the edges brought together by sutures. On the following day the man was free from pain, the tumor much less tense or hard, and the whole leg greatly unloaded.—No perceptible alteration in the heat of the limb could be remarked;—when the current of blood was obstructed in the superficial veins by pressure, on its removal they immediately again became turgid; and in short every appearance indicated a continuance of perfect circulation.

On the 15th day succeeding the operation the ligature came away, the limb was soft and unloaded, and the incision nearly healed; at the distance of six weeks there remains a small tumor, with some perceptible fluctuation. The patient cannot perfectly extend his leg, but is able to walk with the assistance of crutches.

X. *A Case of Paralysis of the Muscles of Deglutition, cured by an artificial Mode of conveying Food and Medicines into the Stomach.*
 By JOHN HUNTER, Esq. F. R. S. Surgeon Extraordinary to the King, and Surgeon General to the Army. Read September 21, 1790.

DISEASES which are not mortal in themselves, may, often, from their secondary effects, become the cause of death; but if these secondary effects are removed, the disease frequently admits of a cure, or even ceases of itself. Thus diseases, when they attack the vital organs, may, from the nature of the parts alone, prove fatal; and this will be sooner or later, according to the particular functions of the parts diseased.

Obstructions to breathing, to the passing of the urine, to the act of swallowing, or the discharge of the fæces, will all terminate in death, if continued for a certain length of time, whatever be the nature of the disease.

Difficulty in swallowing, the subject of the present paper, may arise from a variety of causes,
 since

since an obstruction in any part of the canal leading from the mouth to the stomach, will produce that complaint.

The swallowing our food is a complicated operation, and includes two different actions; the first of these conveys it into the œsophagus; the second carries it along that canal into the stomach; and the parts which perform these two actions are in themselves distinct; so that one may be obstructed, or diseased, while the other remains perfectly sound.

The first action is often impeded, or wholly prevented by inflammation, but this is seldom of long continuance, and the cure is probably promoted by the patient's being obliged to abstain from food. It is also impeded by swellings in the neighbouring glands, but this will commonly be in a less degree; and where it threatens suffocation, or a total prevention of deglutition, the patient can often be relieved by an operation.

The second action is sometimes obstructed, by ulcers in the œsophagus, which have a cancerous appearance; sometimes strictures in that canal, which are of a permanent nature; also spasmodic contractions, which are com-

monly confounded with strictures, but may, I believe, be readily distinguished both from strictures and ulcerations.

Ulcers and strictures, from being permanent diseases, in the end destroy the patient; but spasmodic contractions admit of being cured. I have known a case of this kind get well in a fortnight from the use of electricity, which had not been at all relieved by mercury, although the mouth was affected by it for a month.

There is another cause of difficulty in swallowing, which is the reverse of contraction, viz. paralysis; whether the muscular coats of the œsophagus are ever affected by it, I cannot determine; but the muscles of the pharynx have become paralytic, and the patient has died of hunger.

As this disease is only rendered dangerous from the want of a substitute for deglutition, it becomes our duty to adopt some artificial mode of conveying food into the stomach, by which the patient may be kept alive while the disease continues, and such medicines may be administered as are thought conducive to the cure.

A successful instance of this practice is given in the following case of well marked paralysis in the muscles of the pharynx; the relation of which is given by the patient.

John S——I, about fifty years of age, became hypochondriac, and attacked by what are called nervous disorders, in consequence of anxiety of mind, brought on by various distresses. In the beginning of his complaints, he felt something crack within his head, and from that period his sensations became very acute, his passions, sympathies, and aversions, exceedingly strong.

December 28, 1786, while under the influence of an uncommon degree of hypochondriasis, about one o'clock in the morning, he brought up a glutinous substance from his stomach, like the white of an egg, which seemed to relieve him, but did not remove an aversion which he had taken to his relations, his children, and even to life itself, of which he was tired.

He afterwards continued affected with low spirits and pains in the head, became restless, and turned his mind to religious subjects; as these affections either increased or diminished, he had frequent and severe fits of crying.

About

About the 21st of February, 1790, he had a violent cold in his head, with a considerable running from the nose; and on the 7th of March, between one and two in the morning, awoke with a sense of choaking, and felt soon after a numbness in the whole of his right side, together with a paralysis of the muscles of deglutition, which deprived him of the power of swallowing.

By the advice of a physician he was cupped, blistered round the throat, and electrified; he was, in the mean time, supported by nourishing clysters. March the 9th, finding no benefit from this plan, he waited upon Mr. Hunter, with a letter from Mr. Cumming, watchmaker, accompanied by Mr. Duncan the surgeon.

Mr. Hunter considering the support of the patient, and some mode of administering medicine, to be the first object, proposed that a hollow flexible tube should be passed down into the stomach, through which he might receive nourishment and medicines; and mentioned his having an instrument of that kind, made of spiral wire, covered with gut for the purpose of injecting liquids into the stomachs of animals, which might be applied to the
present

present case; but that Mr. Cumming was better able to assist them in getting a tube that would answer that purpose. He also recommended, when the tube was made, to inject jellies, eggs beat up with a little water, sugar, and milk, or wine, by way of food, and that the medicines might be mixed with it.

In compliance with these directions they contrived a tube, and injected into the stomach some of the abovementioned substances twice a day; three drams of valerian were mixed with this food, increasing the dose to six drams. Laudanum was given in the dose of forty drops, by clyster, and afterwards thirty drops by the mouth; but both doses affected the head, without procuring rest. The valerian was continued till the 26th of March, at which time he had taken four ounces, and had evidently recovered a degree of sensation in his throat. Mr. Hunter was again consulted, and ordered two scruples of flour of mustard, and one dram of *tincture* of valerian, twice a day; under this treatment the power of swallowing gradually returned, and on the 29th the use of the tube was no longer necessary. The natural sensation of the throat and right arm had not returned in the month of April.

The

The instrument made use of was a fresh eel-skin, of rather a small size, drawn over a probang, and tied up at the end where it covered the sponge, and tied again close to the sponge where it is fastened to the whale-bone, and a small longitudinal slit was made into it just above this upper ligature. To the other end of the eel-skin was fixed a bladder and wooden pipe, similar to what is used in giving a clyster, only the pipe large enough to let the end of the probang pass into the bladder without filling up the passage. The probang, thus covered, was introduced into the stomach, and the food and medicines were put into the bladder, and squeezed down through the eel-skin.

The instrument did not produce irritation in the fauces or œsophagus; in such cases, the parts losing their natural sensibility, allow greater liberties to be taken with them. An eel-skin seems very well adapted for this purpose, being smooth, pliable, and readily passed into the stomach; but as cases of this kind may occur where eels cannot be procured, a portion of the gut of any small animal, as a cat or lamb, will make a very good substitute.

XI. *Of a remarkable Deviation from the natural Structure in the urinary Bladder and Organs of Generation of a Male.* By MATTHEW BAILLIE, M. D. F. R. S. and Physician to St. George's Hospital. Read January 18, 1790.

THE subject of the present paper does not seem to throw any considerable light either on the physiology or pathology of the human body, yet it is not altogether unimportant. It exhibits a view of a singular variety in a very essential part of the structure of the human body, has been rarely observed, and, I believe, has not as yet been fully described *.

The person in whom this variety was found was a man of about forty years of age, of a short stature, of a robust habit, and of a very dissolute life. Having occasionally got a good deal of money, by exhibiting himself to public curiosity, and having acquired habits of idleness, he very readily fell into drunkenness,

* There is a short history of a similar monstrosity, by James Mowat, surgeon at Langholm, in which many particulars have been omitted. Vid. *Edinb. Essays*, Vol. III. article 14.

loose projection of skin, corresponding to the prepuce. It was connected to the glans by a chord like the frænum, but was neither sufficiently pliable nor large to cover the glans, as in ordinary cases.

There were two considerable oblong swellings at the groin, covered with hair. Upon the inside the swellings were formed of fat, and had passing through them the spermatic chords. They terminated below in a sort of corrugated tuberculated skin, forming the scrotum. The cellular membrane on the inside of it, instead of being spongy as usual, was of a very firm compact texture. By this membranous texture the testicles adhered very firmly to the inside of the skin of the scrotum, and the scrotum was divided into two lateral cavities, by a stronger septum than I ever recollect to have seen.

INTERNAL VIEW.

Upon the inside, corresponding to the situation of the vascular spongy mass, there was a sort of projection, not unlike the posterior outer view of the urinary bladder. It consisted of an arrangement of muscular fibres,
similar

similar to those in the bladder, but somewhat stronger, and had opening through it the two ureters. These ureters were of a larger than the ordinary size, and had probably been enlarged artificially.

This person had a custom of thrusting a knitting-needle up each ureter when he exhibited himself to gratify curiosity, which might, perhaps, encrease a little the size of the ureters near their external openings.

Above this appearance of bladder, there was a considerable space between the muscoli recti abdominis occupied by tendon and the peritonæum. In the middle of this space passed the umbilical vein, degenerated into a sort of ligament, so as to reach the upper edge of what corresponded to the bladder, where it was lost behind the integuments. The umbilical arteries climbed up each side of what corresponded to the bladder, and lost themselves behind the integuments at the same place with the vein. This place corresponded to the fine puckered skin above the vascular mass mentioned in the external description.

Upon each side of the substance corresponding to the bladder, the recti muscles

O

passed,

the most prevailing vice among the lower class of people. He was at length very rarely sober, and in one of his fits of inebriety he died. Through the kind offices of one of my medical friends, he was brought to Windmill-street for examination.

DESCRIPTION. *External View.*

In the external view of the abdomen was seen, immediately above where the symphysis pubis is commonly placed, a vascular pulpy mass, about two inches in transverse diameter, and an inch and an half from its upper to its lower edge *. This mass was seated in a deep bed, scooped out, as it were, from the lower part of the skin and muscles of the abdomen. When this mass was examined a little more particularly, it seemed to resemble somewhat the posterior surface of the tongue, but without any follicular appearance. In three places it projected into tubercles of no very considerable size, and upon two of these the ureters opened. At the upper edge of

* This pulpy mass was covered with a thick layer of viscid mucus in the living body, in order to defend it from the stimulus of the salts contained in the urine.

this mass the skin was in one part finer than is natural, and a little puckered. This was all the appearance of navel in this subject, for there was none in the usual place. At the lower edge of this mass; and about the middle of that edge, were situated two distinct rounded orifices, which were found to be the openings of the vasa deferentia and vesiculæ seminales. Between these two orifices, and a little above their level, was a considerable canal, large enough to admit a goose quill, and leading to the substance of the prostate gland.

About half an inch under the vascular mass I have described, the penis was seen, of the common size with respect to transverse diameter, and about a little more than an inch in length. The whole of the upper surface of the penis was somewhat hollowed, and had a finer skin than the common covering of that part. Near its extremity, the canal corresponding to the urethra opened by a pretty large oval orifice. The glans was of the common texture, but somewhat different in its shape, being hollowed upon the upper surface. It was covered by a thicker cuticle than usual, from its being bare and exposed to friction. Under the glands there was a
loose

loose projection of skin, corresponding to the prepuce. It was connected to the glans by a chord like the frænum, but was neither sufficiently pliable nor large to cover the glans, as in ordinary cases.

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I N T E R N A L V I E W .

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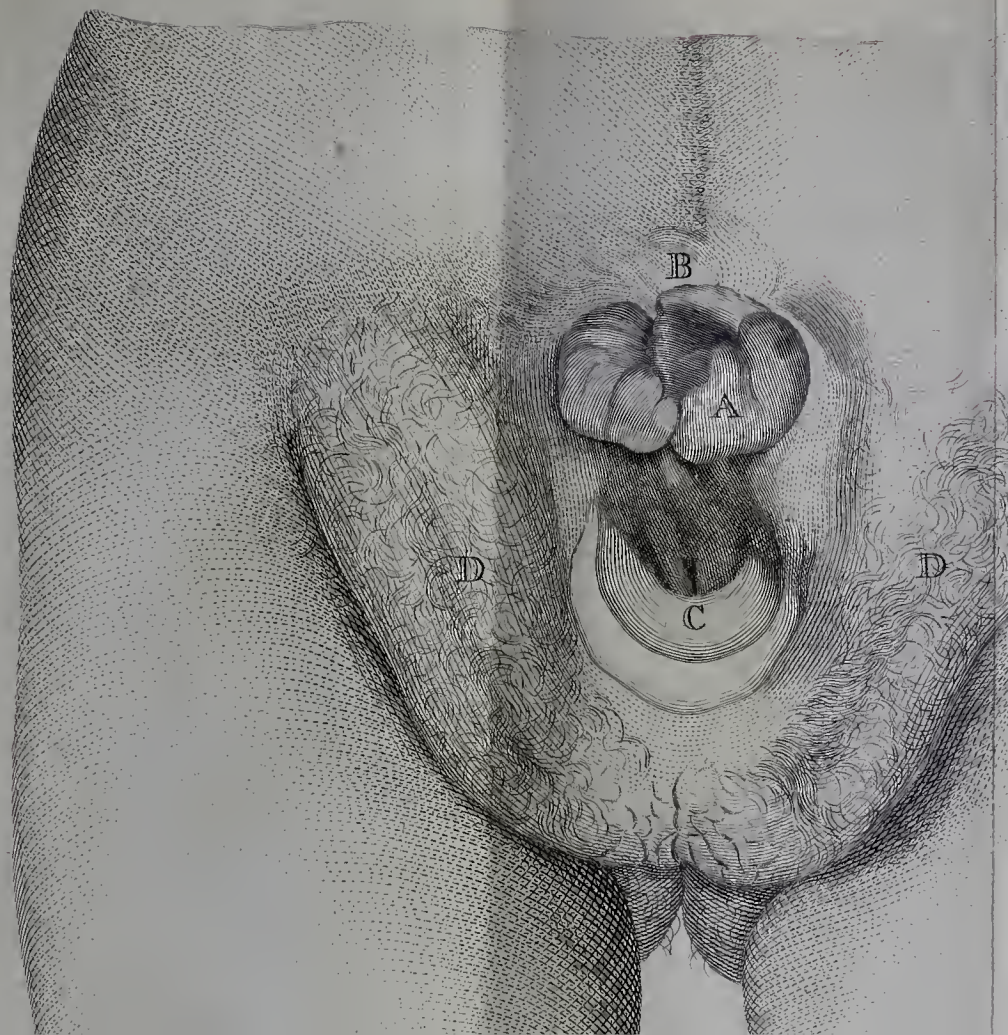
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O passed,



communicated with a considerable cavity, situated at the bulb of the urethra, and having the same lining of membrane with the urethra itself. In this cavity could only be seen the orifices of the lacunæ, and posteriorly it terminated in a cul de sac.

The *erectores penis* and muscles corresponding to the *acceleratores urinæ*, had very nearly the natural appearance, but the *transversi perinæi* were seven or eight times larger than usual. The muscles about the anus were exactly natural.

The testicles were of the common size, but the *tunica vaginalis* was almost obliterated on each side, probably from inflammation. Their texture was perfectly natural; they were supplied in the common way with blood-vessels, and the *vasa deferentia* and *epididymis* seemed of the ordinary structure. The *vasa deferentia* and a portion of the *epididymis* were injected with quicksilver, to shew that the canals were pervious. On each side the *cremaster* muscle was stronger than I almost recollect to have seen it in any body. There was also a hernia upon the right side, in which a portion of the omentum was lodged.

In the anterior part of the pelvis, where the symphysis pubis is usually situated, there was a deficiency of bone for nearly four inches. This was filled up by a broad ligamentous membrane, becoming a support to the viscera of the abdomen, and keeping some of the parts which I have mentioned in a fixed situation. The two acetabula were also removed at somewhat a greater distance from each other than in an ordinary male pelvis.

In every other part of the body of this person, the structure was perfectly natural.

Such are the particulars of this very uncommon monstrosity, and they afford very little room for reflection.

It appears clearly, from the account we have given, that this person was in every respect a male, and had no mixture whatever of the other sex. The testicles and vasa deferentia were natural, so that the secretion of the semen could take place as in ordinary cases.

This state of the testicles was probably accompanied by the venereal appetite as in ordinary men, but still he may have been said to have been impotent.

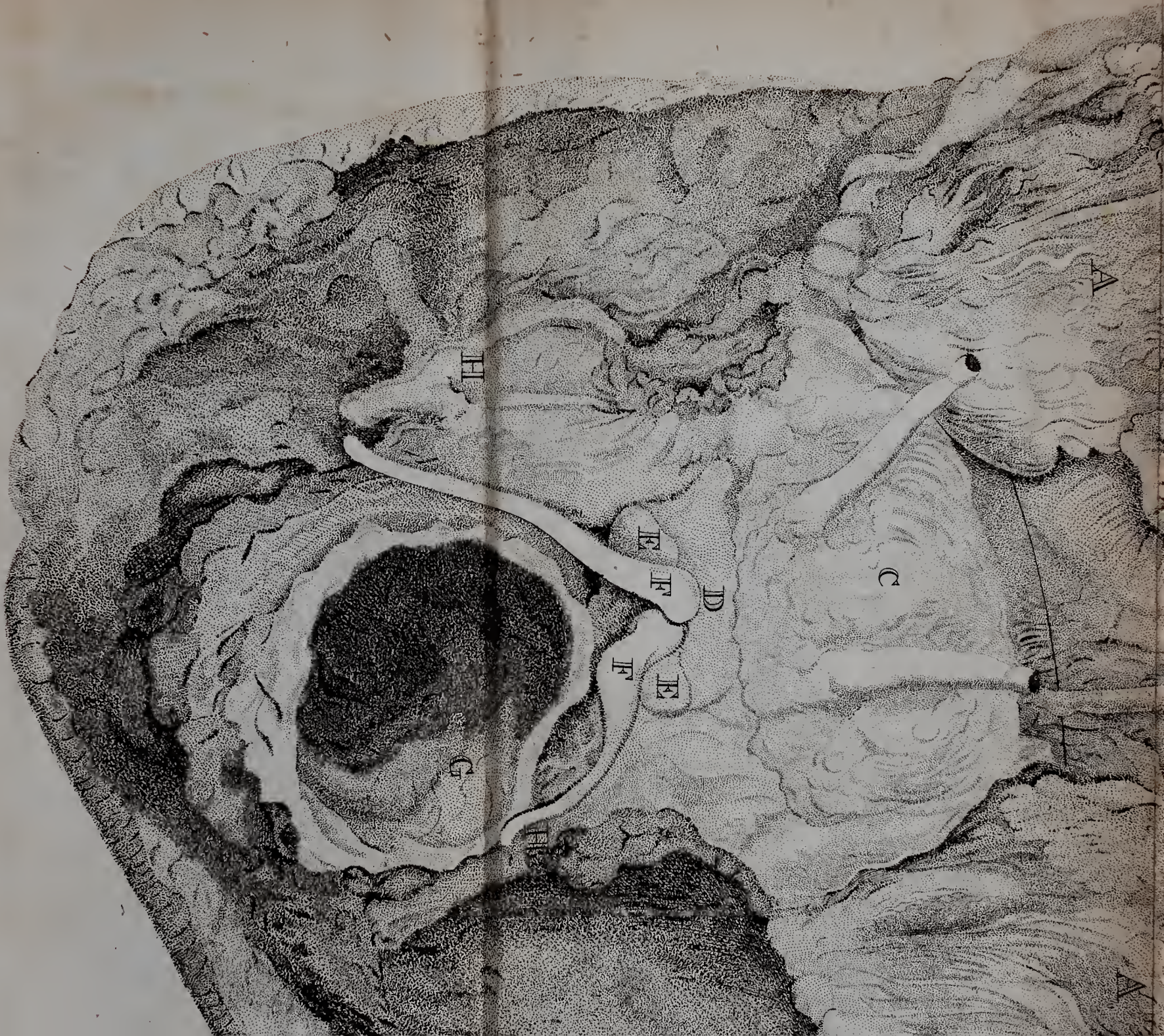
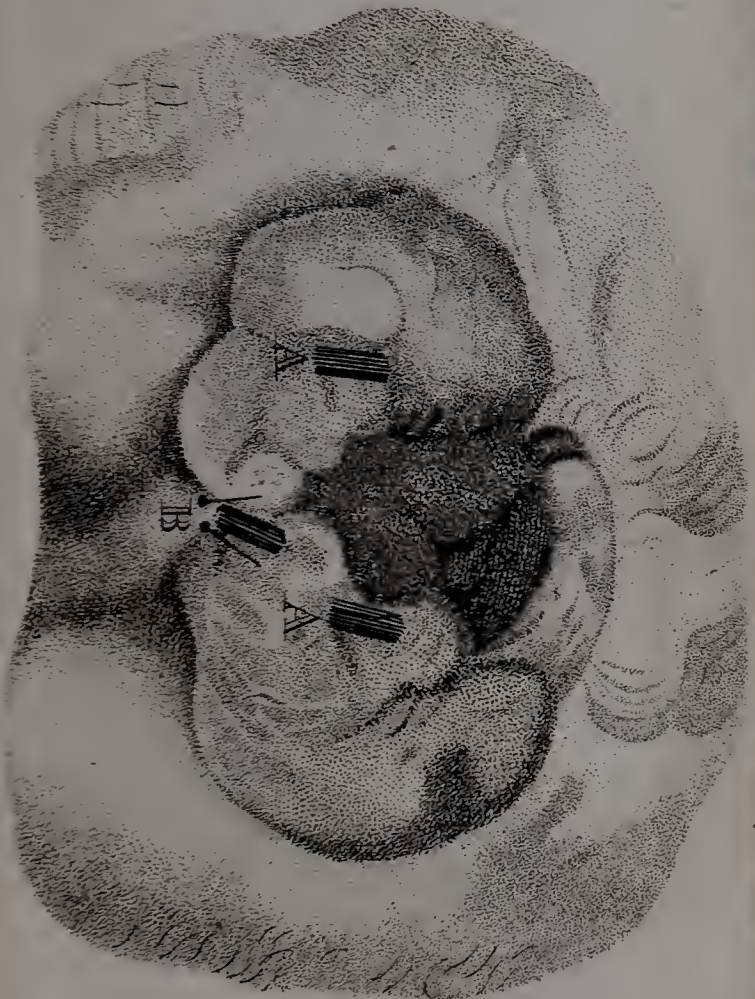


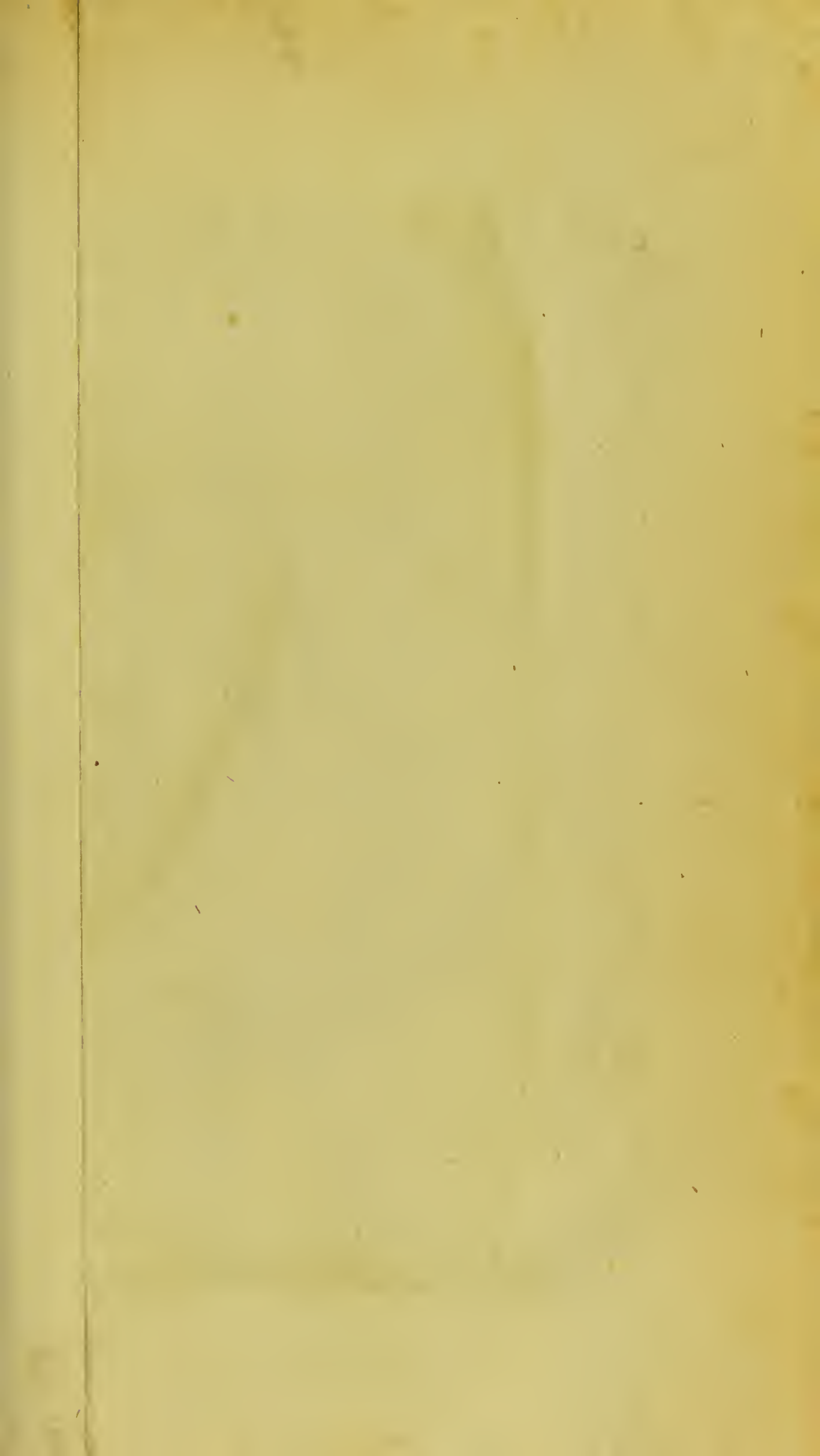
Fig. 2.

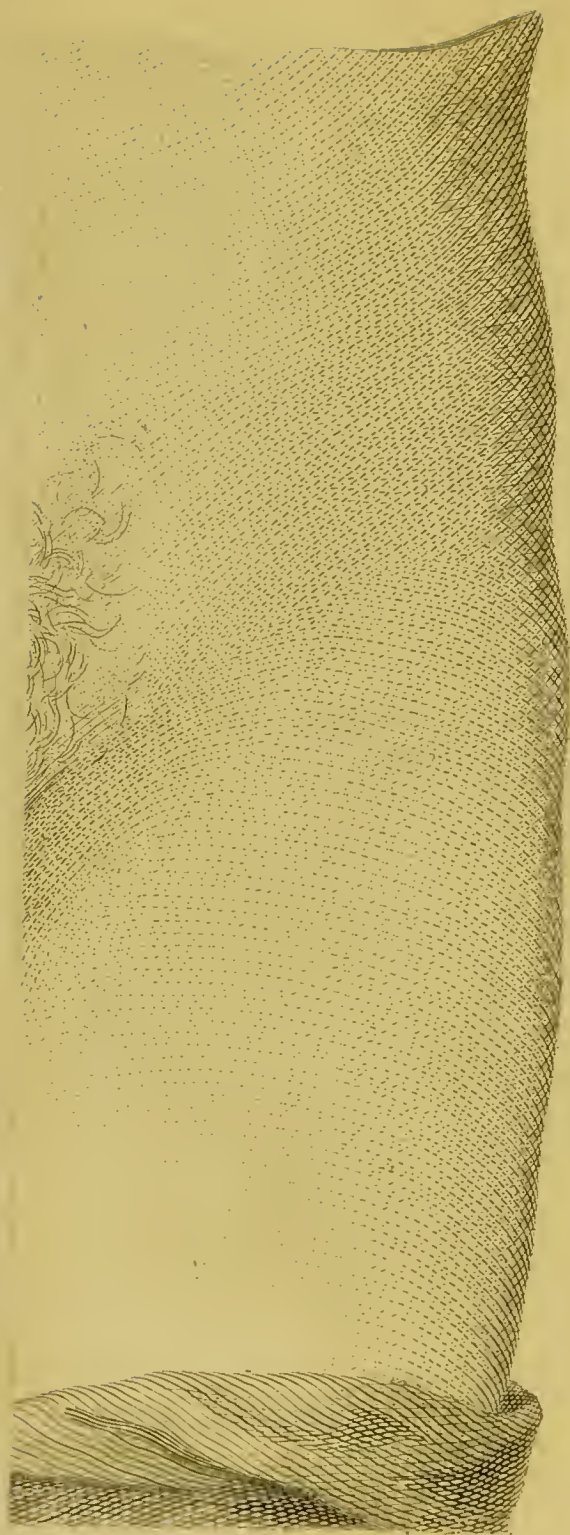


contain a certain quantity of urine, for the greater convenience of the animal. This might be readily inferred a priori from reasoning, without a single instance of it having occurred; but it is certainly known from the classes of animals in whom no bladder is naturally found.

The deficiency of the pelvis at the anterior part, and the distance between the two acetabula being a little greater than usual, had some effect upon his manner of walking. His step was less firm, the lateral motion of his body greater, and his progress consequently slower, than in common men *.

* Since this paper was written, I have met with a monstrosity of the same kind, in a young man about twenty, who is a native of Cologne. In the external appearance of the abdomen there is no difference between this case and that which I have described, except that in the former the vascular pulpy mass was more protuberant than in the latter, and the opening of the ureters more dependent. The conjecture which I have formed about the venereal appetite is confirmed by what I have learned from this person. His penis is often erected at the view of females, but, from the structure of the parts, he is incapable of producing impregnation.—A description of the external appearance of the parts in this person has, I understand, been given by professor Bonn of Amsterdam.





P L A T E VI.

- A. Pulpy vascular mass.
- B. The appearance of a cicatrix in the skin, as a substitute for the navel.
- C. The penis, with an orifice seen upon its upper surface; and under it a thick fold of skin, as a substitute for the prepuce.
- D. D. The scrotum, with hairs upon it.

P L A T E VII.

F I G. I.

- A A. Portions of the musculi recti abdominis, separated at a considerable distance from each other.
- B. The umbilical vein seen over two bristles, shrunk into a solid mass.
- C. The posterior view of what corresponded to the bladder, with the two ureters seen entering into it. The ureters contain bougies.
- D. A small imperfect prostate gland.
- E E. Very small imperfect vesiculæ seminales.
- F F. The vasa deferentia.
- G. The rectum, with its internal vascular membrane seen.
- H H. The origins of the corpora cavernosa penis separated at a great distance from each other.

Fig. 2.

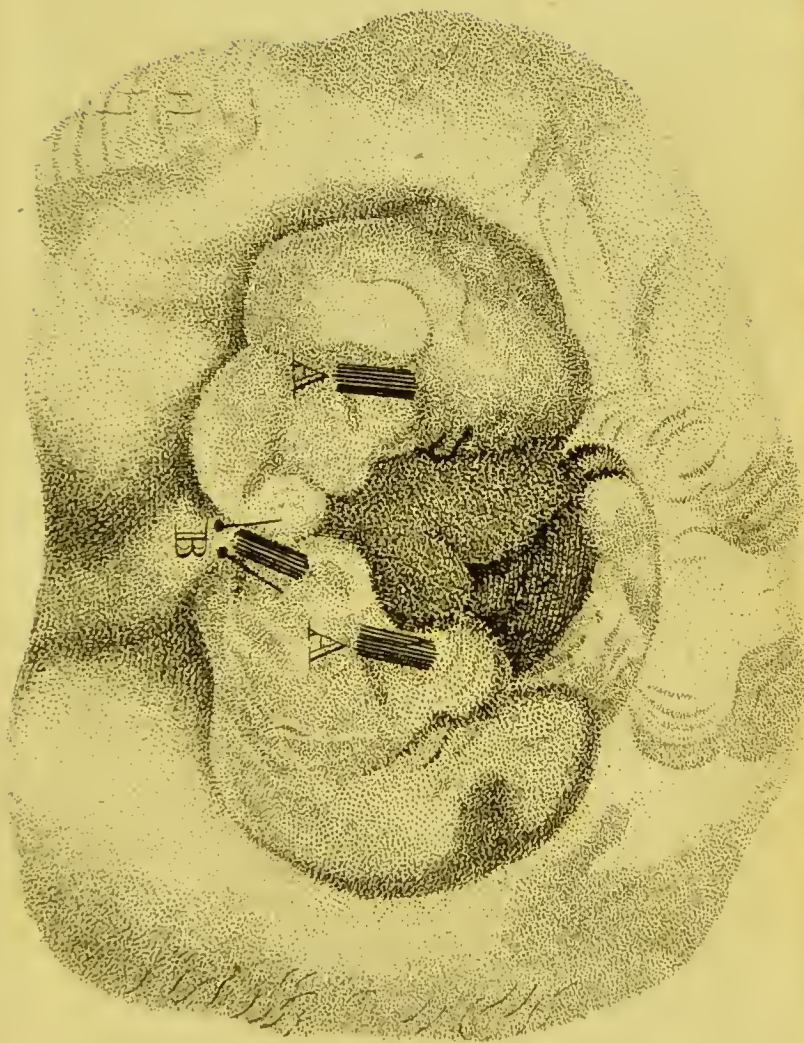


Fig. 1.



F I G. II.

A A. Two bougies in the external openings of the two ureters upon the pulpy mass.

B. Two bristles in the openings of the vesiculæ feminales, and a bougie in an opening which led to the prostate gland.

XII. *A Case of EMPHYSEMA, not proceeding from local Injury.* By MATTHEW BAILLIE, M.D. F.R.S. *Physician to St. George's Hospital.* Read July 19, 1791.

I HAD lately an opportunity of observing a very uncommon appearance of disease in the living body, as well as of examining its extent after death.

Margaret Buck, aged about ten years, was admitted nearly three months ago a patient into St. George's Hospital, with anasarca and ascites. Two days before her death I was desired by the apothecary of the hospital to see her, as Dr. Ford, the physician, who had for some time attended her, could not come on that day to the hospital. When I saw her lying in bed, her appearance differed in nothing from that of a person highly anasarous, nor should I have at all suspected that there was any peculiarity in her complaint. Upon attempting to feel her pulse, however, I was surprized by the crackling of air under my fingers, and the skin was considerably elevated,

elevated, so that the pulse by that means was indistinctly felt. I then pressed upon the skin of the back, breast, belly, &c. and there was the same crackling of air. Air was also felt in the cellular membrane of the inside of the thighs. There was, at the same time a considerable quantity of water accumulated in the cellular membrane of the legs and face, as could be readily distinguished by the doughy feeling upon pressure. The girl herself lay in a sort of stupid state, expressing, however, a sense of considerable pain, and having a good deal of difficulty in breathing.

After having examined the patient I sent for Mr. Walker, one of the surgeons of the hospital, who was at that time in the house, that he might have an opportunity of seeing this very curious appearance of disease, and desired that small openings might be made through the skin for emptying the air. The patient died on the next day, and I took an early opportunity of examining the full extent of the disease by dissection.

Air was found diffused through the cellular membrane of the trunk, arms, thighs, &c. as formerly related. Upon making an opening
into

into the cavity of the abdomen, the stomach was found distended, almost as far as it could stretch, with air, and the whole intestinal canal was moderately filled with it. The air too had penetrated into some parts of the cellular membrane of the stomach and intestines. The laminæ of the peritonæum, composing the mesentery, were separated at some distance from each other by the air which occupied its cellular membrane, and the small vessels running upon the stomach and intestines were universally filled with it. There was about a gallon of water in the cavity of the abdomen.

Upon opening into the cavity of the chest, a great quantity of air was found in the cellular membrane between the pleura and the pericardium, but none could be discovered in the cellular membrane connecting together the air cells of the lungs. A considerable quantity of water was found in the cavity of the pericardium, and about two pints in the left side of the thorax.

What is remarkable in this case is, the collection of air without any external injury in the cellular membrane of any part of
the

the body. Emphysema generally spread over the body has been observed to take place in two ways; the one way is, by air escaping into the cellular membrane of the body, in consequence of the lungs being wounded by a broken rib; the other way is, when air is generated by a putrefactive process, as occasionally happens in mortifications. Neither of these could have been the cause of emphysema in the case which I have related.

1st. It did not arise from any accident, as that of a broken rib wounding the lungs. We are perfectly clear upon this point from the following circumstances, viz. when inquiry was made, the patient could recollect no injury nor violence whatever having been lately done to her chest, and upon examination after death the ribs were all found to be entire.

2d. The emphysema did not arise from putrefaction. There was no sign of putridity whatever in the patient before death, and upon pressing out the air in our examination after death from different parts, there was no fetid smell to be perceived, even in the smallest degree.

There are two ways in which emphysema, not arising from external injury, particularly when preceded by anasarca, may be supposed to be produced; the one is, that the watery fluids, poured into the cells of the cellular membrane, may undergo some chymical change, by which air is separated from them; the other is, that the small blood-vessels distributed on the cells of the cellular membrane, may have some power, under particular circumstances, of secreting air, which is afterwards accumulated in these cells. Which of the two was the cause in the present instance I will not positively determine, altho' I am inclined to think it was the latter. In cases, however, of emphysema, generally arising without external injury, I should not hesitate to believe, that the most frequent cause is, the secretion of air by the small blood-vessels distributed upon the cells of the cellular membrane.

That the blood-vessels have this power, there can be no doubt. Complete bags are found in some animals, containing air, being part of their natural structure, as for instance in many fishes. The air could, under such circumstances, be separated only by the small
vessels

vessels distributed on the bags themselves. Complete bags, containing air, are sometimes found attached to the mesentery of pigs, where it could not enter *ab externo*. It is very probable also, that in cases of tympanites the air is secreted by the small vessels opening upon the villi of the internal membrane of the intestines, and thrown into their cavity *.

There is no difficulty in our conceiving the possibility of this action of the blood-vessels taking place; it is just as easy to conceive air secreted from the blood by the action of the vessels, as the secretion of the bile, milk, or any other secreted fluid †. How far the air found in the small blood-vessels of the stomach and intestines in a dead animal is to be considered as a decided proof of this opinion, I will not absolutely determine; but most commonly where I have found air in the in-

* Mr. Hunter has taken notice, in his Essay upon Digestion, of a power in blood-vessels to secrete air; and he has illustrated it by some of the examples here given, as well as by others.

† What is the peculiar process of air being separated from the blood in the blood-vessels, I cannot pretend to say; but we are equally unacquainted with the peculiar process which takes place in the separation of any other fluid from it.

testinal canal, I have also found it in its small blood-veffels. The time taken up by this process in the present case was short; the emphysema had not been observed by the physician, who had seen the girl two or three days before that on which I was desired to visit her; and Mr. Dampier, the apothecary, told me, that she had swelled suddenly about a day before I saw her.

Cases of emphysema arising without external injury or putrefaction, are extremely rare. In looking over a number of books, containing accounts of cases and dissections, I have found only one example at all analogous to the case which I have related. It is described in a collection of medical cases published by Dr. Sickel, 1744 *. In the case to which I allude, emphysema is said to have spread suddenly over the body of a woman, aged above forty, without any external injury whatever, and on the next day to have left her in good health.

The account which the doctor has given of the cause of this complaint is, that, a little before its appearance, the woman had eaten some mustard-seed and eruca along

* Vid. Sicelii Decad. quartam, p. 487.

with

with a faufage, which had expanded and fet in motion the air contained in the blood, and other humours, in confequence of which it was carried into the cellular membrane producing emphyfema.

I have found fince writing this paper, that Monf. Littre has mentioned, that where there is emphyfema from a wound in the lungs, the air taken in by refpiration may be forced into fmall blood-veffels, and carried over the whole body in the general circulation, fo as to affift in producing univerfal emphyfema. The expreffions are as follows in the account given of his opinion:—" L'air etranger tous jours pouffé peut comme il'a eſté dit, entrer dans les veines & dans les routes de la circulation, & par confequent ſe repandre par toute l'habitude du corps *." In this opinion I believe Monf. Littre to be miſtaken; and the air let looſe by the wound in the lungs, is fufficient to account for the production of general emphyfema, without the aid of any other cauſe whatever. We ſuppoſe the air to be generated in the blood-veffels themſelves, and to be thrown out in the form of a ſecreted fluid into the cellular membrane,

* Vid, Memoir, Acad. Sciences, 1713.

I have found too, that Dr. Huxham, in a letter which he has published in the Medical Observations, has mentioned as a conjecture the formation of elastic air in the blood-vessels; but he has considered it as a putrefactive process, and connected only with putrid diseases. His words are, “ and it is not improbable, that
 “ elastic air may be generated even in the
 “ arterial and venal system, and be productive
 “ of terrible symptoms, vast oppression, anxiety, palpitation, intermitting pulse, delirium, &c. which are too often observed
 “ towards the end of putrid fevers *.”

We consider, however, the air deposited in the cellular membrane, in the case we have related, as having no connection with a putrefactive process, but as being formed from the blood itself, by some peculiar arrangement of its parts, and conducted into the cells of the cellular membrane by very small vessels. The opinion, therefore, brought forward in the present paper, is widely different from all of these; we believe it to be new, and we have been chiefly led to it by what

* See Medical Observations, Vol. III. p. 33. where a case is related by Dr. Huxham of emphysema having arisen during the course of a putrid fever and sore throat.

Mr. Hunter has said about the formation of air in his Essay upon Digestion.

Whether the air contained in the cellular membrane and the intestinal canal of the girl, whose case I have related, was the same, I cannot possibly determine, because I did not, at the time of examining the body, think of collecting the air; it is probable, however, that the process of forming air was exactly the same over the whole body, and therefore that the air itself, or the result of that process, was the same likewise. I have twice examined the air which is accumulated in the intestinal canal. It was not inflammable, but, on the contrary, extinguished flame; when made to pass through lime-water, it rendered it turbid, and chalk was deposited. The air is, therefore, either entirely of that sort called fixed air, or at least that air is in some very sensible proportion *. I am not, however, so much accustomed to chymical experiments, as to be satisfied with my own examination of any substance whatever in that way.

* Dr. Pearson has informed me, that he has examined some air from the intestinal canal very lately, and that it consisted of fixed and phlogificated air, the first in a small, and the last in a much larger proportion.

XIII. *A Case of unusual Formation in a Part of the Brain.* By Mr. A. CARLISLE; communicated by Dr. BAILLIE. Read Oct. 25, 1791.

MARY HARVEY, a woman apparently near twenty years of age, was admitted into the Westminster Hospital on the 2d of July, 1791, with an ulcer affecting the tarsal bones of the foot, and her general health being much impaired, she was advised to have the foot removed. The operation was performed by Mr. Lynn, on the 10th of July, but a considerable degree of fever supervening, together with great irritation, she died about eight days afterwards. In the course of examining her body, which was done in presence of Mr. Morel, one of the surgeons to the hospital, we proceeded to inquire into the state of the brain; and, upon removing the dura mater from the superior part of the cerebrum, a very uncommon appearance presented itself. The falceform process was entirely wanting; the lower edge of the triangular cavity, forming the superior longitudinal sinus, projected; but there was no portion of the dura mater
whatever

whatever appended to it, and this defect prevailed equally from the crista galli, backwards to the tentorium. A depression was evident along the middle of the superior part of the cerebrum, about half an inch deep, which corresponded to the lower edge of the superior longitudinal sinus; but this was simply a depression, for there was no separation of the cerebrum, as is usual, into two hemispheres, it being completely formed of one substance. Although much care was taken in the dissection, and a very sharp knife used, yet not the smallest portion of pia mater could be traced in the situation of the natural cleft; a transverse section was then made through the cerebrum, keeping above the level of the corpus callosum, but still no vestiges of membrane, or of cineritious substance, or of previous inflammation or adhesion, were to be found; so that it shewed every appearance of this being the original formation. The union of what ought to have been the hemispheres, extended down to the corpus callosum, which was difficult to be distinguished from the common medullary substance of the brain. Every other part of this organ was in a perfectly natural state,

excepting that the opening in the tentorium, through which the cerebrum joins to the cerebellum, appeared larger than is common. The woman, previous to the operation, had her intellectual powers as perfect as people usually have; and she was not observed to complain of any particular affection in her head. I mention those circumstances, to shew how little we know of the physiology of the body, as connected necessarily with its structure; for had the present appearance been discovered in dissecting the body of a man, who had been subject during his lifetime to any disorder which had been supposed to depend on the brain, it is more than probable that it would have been assigned as the cause of the malady. Such cases, however, as the above may teach us, that although the formation of an organ in the animal body should be considerably varied from the customary plan of nature, yet the perfect and usual function of such a part may be carried on so well by this substituted modification, that we can hardly call it an imperfection.

XIV. *History of a fatal Hæmorrhage from a Laceration of the Fallopian Tube, in a Case of an Extra-uterine Fætus.* By JOHN CLARKE, M.D. *Physician to the General Lying-in Hospital in Store-street, and to the Asylum for Female Orphans.* Read Oct. 25, 1791.

TO DR. BAILLIE.

Dear SIR,

I WILL trouble you to communicate to the Society the following very remarkable history of a case, which, in some respects, is different from any, which it has occurred to me to meet with in the books that I have read.

It is accompanied with a drawing of the parts: and, as a farther demonstration of the facts, I will beg you to shew to the Society the preparation of the parts from which the drawing has been made, which both exhibits the structure arising from impregnation, and also the lacerated surface, and the coagula at the extremities of the vessels.

I am,

Dear SIR,

Yours, &c.

JOHN CLARKE.

H I S T O R Y.

THE subject of the following case was a married woman, about thirty years of age. Previously to the attack of the complaint which destroyed her, she had been occasionally subject to some bilious complaints: in all other respects she had enjoyed a tolerably good state of health, and had borne one child. About two months before she died, she perceived a return (as she thought) of what she called her bilious complaints, on account of which she took, of her own accord, some medicines, which she had been accustomed to employ upon similar occasions; and she paid so little attention to an obstruction of the menstruous discharge for one period, as never to have mentioned it to her husband, nor to her apothecary, until a few days before her death.

On the 12th of May, 1791, she went into a warm bath, with a view to relieve her bilious complaints, and on Friday, the 13th of the same month, in the morning, without any previous exertion, she was suddenly seized with a violent pain in the lower part of her belly,

belly, on account of which she lay down upon a sofa in the room, where she fell into a fainting fit, from which, after a few minutes, she recovered.

At this time she sent for her apothecary, a very sensible and intelligent man, who, as she still complained of great pain, took away about eight ounces of blood, supposing that there might be inflammation in some part of the cavity of the abdomen, and directed her to take some laxative medicines, in order to evacuate the intestines, which were attended with the desired effect. The pain, however, still remaining, he exhibited an opiate to procure relief, which it did in some degree, tho' not entirely.

He kept the bowels open, and palliated the pain by anodynes taken internally, thrown up the rectum by clyster, and applied externally by fomentation, which formed the plan of treatment, and was pursued uniformly through the whole course of the disease.—Nevertheless the pain was not removed by these means, but returned with great violence by paroxysms, both in the belly and near the loins, and was generally accompanied with vomiting, yawning, and fainting. The pulse during all this
time

time was not frequent, and the tongue was of its natural colour.

By the frequency of these attacks her strength was very much reduced; nevertheless, on Monday (May 16th) she thought herself rather better in the course of the day; but towards the evening her pain returned with aggravated violence, and she became extremely faint and low.

At this time I was desired to see her. I found her extremities in a cold sweat:—there was no pulse at the wrist; she was exceedingly restless, and almost incapable of speaking (though she had within a quarter of an hour been very sensible); she became in a few minutes more and more restless, more and more faint, and expired.

After her death we were desirous of ascertaining by dissection, if it were possible, the cause of this uncommon disease, which proved so suddenly fatal; and having obtained leave from her relations, we examined the body on the following day.

Upon dividing the integuments over the cavity of the abdomen, we were struck with the gushing of blood in large quantity, which, when collected, amounted to nearly a gallon.

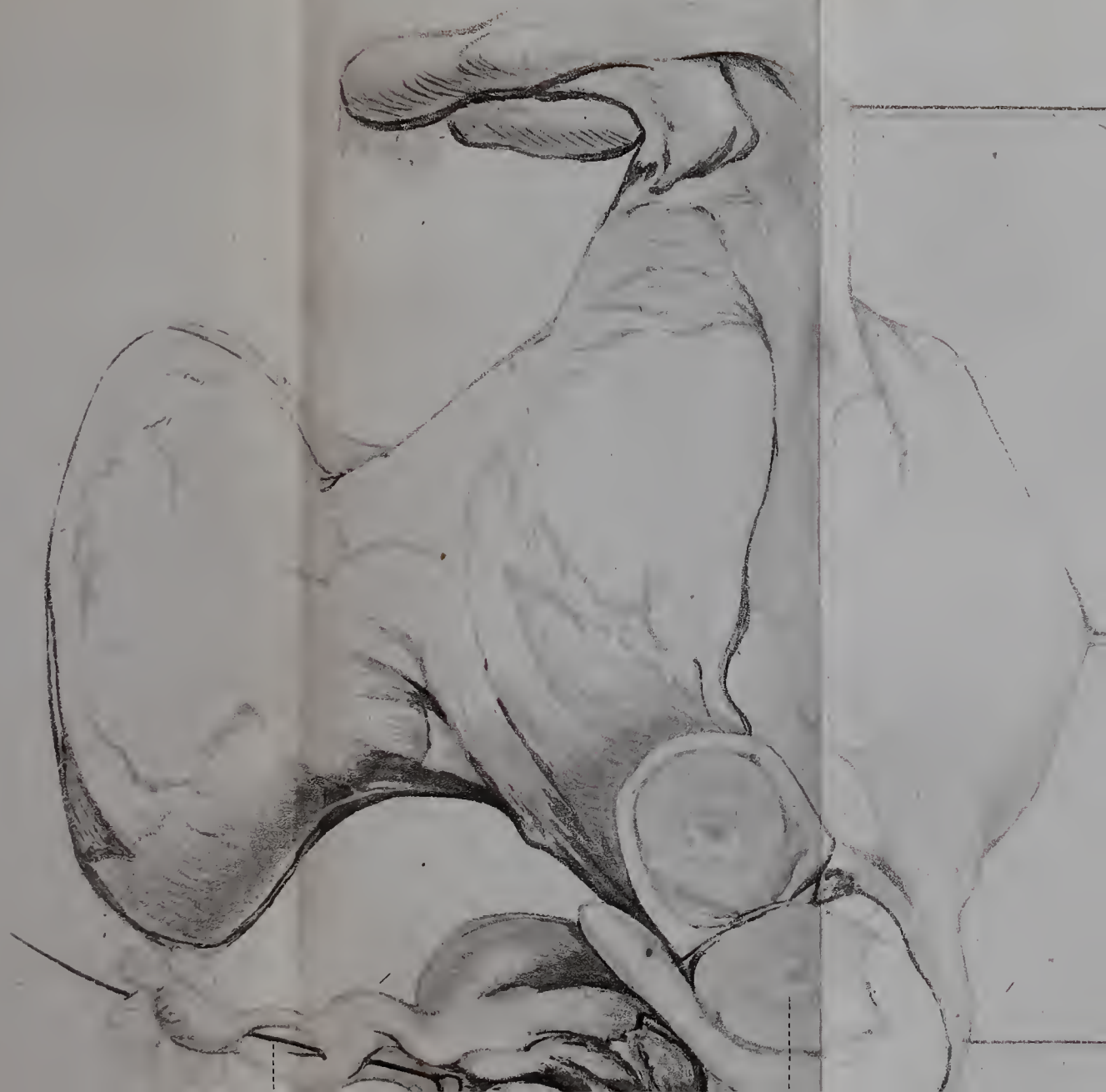
gallon. It was partly fluid, and partly coagulated. When we had cleared away the blood, the viscera presented themselves not only free from any appearance of inflammation, but even more pale than they are commonly found.

We now sought for the source of the hemorrhage in the situation of all the large vessels near the liver, spleen, mesentery, &c. but in vain. Upon taking hold of the uterus, it felt more pulpy than it commonly does, and was enlarged rather beyond its natural size in an unimpregnated state. Passing the hand into the cavity of the pelvis, in the posterior chamber, to wit, between the broad ligaments and the rectum, I perceived still remaining there a quantity of coagulated blood. This I removed, and, after having carefully examined all the surfaces, discovered a lacerated appearance, surrounded with masses of coagulated blood, in what at that time seemed to be the right ovarium. I therefore cautiously removed the uterus with its appendages, and reserved them for farther and more accurate investigation than could at that time be afforded.

When the blood was removed from the part (which in the confusion occasioned by
coagula

coagula appeared to be the right ovarium) a laceration was found to be in the Fallopian tube, about an inch and an half in length, each extremity of which was about an equal distance from the respective termination of the tube in the fimbriæ and in the uterus. The distention of the tube at this part was nearly of the size of a large walnut, forming a kind of pouch. More of the coagulated blood being removed from the lacerated part, the shaggy vessels of the chorion immediately appeared, interspersed with small coagula, and lying in contact with the internal surface of the pouch formed by the Fallopian tube: these being separated, and the chorion divided, the amnios shewed itself, containing a fœtus perfectly formed, of about six or seven weeks growth. The Fallopian tube was pervious, both leading from the fimbriated extremity to the pouch containing the ovum, and from the pouch to the inside of the uterus, so as to be capable of containing a bristle. The diameter, or calibre of the tube between the fimbriæ and the pouch, was rather larger than it is usually found in the impregnated state. The right ovarium was the next object of examination,

in



no exclusive power of forming or nourishing a foetus; that, in fact, it does not possess the former property at all, and the latter only in common with other parts; but that it is only better calculated for this function by its being entirely appropriated to it, and by having an external opening for the expulsion of the foetus.

One thing particularly deserving of notice in the present case, is the formation of the *membrana decidua* in the uterus before the ovarian ovum * had reached it.

For the knowledge of this fact, which is eminently confirmed by the present case, we are indebted to the acute observation of Dr. William Hunter, who, in regard to the anatomical investigation of the gravid uterus and its contents, stands high above all comparison.

The uterus then with its appendages, the ovarium and the Fallopian tube, resembles a piece of mechanism, each of whose parts has

* By ovarian ovum, I mean the ovum as it comes from the ovarium, or at least as it exists in the Fallopian tube, consisting of two membranes, the chorion and the amnios, which contains the liquor amnii and the embryo, but without the decidua, which membrane is formed by the uterus.

offices peculiar to itself, though conducing to the same general end.

Thus the ovarium, after impregnation, forms the fœtus, which, with its membranes, is transmitted through the Fallopian tube, whose particular function it is to catch the ovum as it comes from the ovarium, and carry it down into the cavity of the uterus. The office of the uterus is to form the decidua for the reception of the ovum, to secrete the mucus in the cervix, to nourish the fœtus during its abode there, and afterwards to expel it; so that each part has its own particular duty, separate and distinct from that of all the rest. But as each organ, tho' individually designed for certain purposes, makes a portion of the whole system for generation, so it seems that the stimulus, or impression for action, is communicated to the whole at once, consequently to every part of that whole. From the application of this stimulus, or impression for action, the uterus, as soon as impregnation has taken place, begins to form the decidua, in order to prepare for the reception of the fœtus. Even if the ovarian ovum should not enter the uterus, the organ still performs its office,
having

having already received the stimulus for that purpose, in consent with the whole, and independently of the fortuitous delay of the ovarian ovum, either in the ovarium itself, the cavity of the abdomen, or the Fallopian tube. Another circumstance worthy of remark in this case is, the sickness which the patient had attributed to an habitual bilious complaint. There appears to be little reason for doubt, that this was occasioned by the state of pregnancy; and it seems to prove, that the sickness in pregnancy depends upon the general process going on, and not on the affection of any particular part; at any rate, it has no connection with the residence of the fœtus in the uterus.

But the most remarkable thing in this case, is the laceration of the Fallopian tube, and the fatal hæmorrhage thereby occasioned, especially when we consider that the patient could not have been in a pregnant state more than seven weeks. It is difficult to account for the rupture of the tube, which seems to have happened spontaneously, at a time when she was not only making no extraordinary exertions of body, but none at all, and one could
hardly

hardly have believed, a priori, that hæmorrhage to such an extent could have arisen from the Fallopian tube, even though enlarged in its capacity, as happened in this case, from the growth of the ovum in it. It is plain, from a view of the pouch containing the ovarian ovum, that the vessels are more numerous than in the natural state of a Fallopian tube ; yet still it seems very surprising when we consider that the enlarged part did not exceed the size of a walnut, so much blood could have been poured out from so small a part.

The first sensation of pain complained of by the patient, may be probably referred to the rupture of the Fallopian tube. As both the pain and the fainting occurred by paroxysms, it is likely that the loss of blood was restrained in the intervals by the coagulation of a part of it at the extremities of the vessels, and that when the pain was aggravated, it was owing to an increase of the laceration, from which more blood being poured out, the patient again fainted.

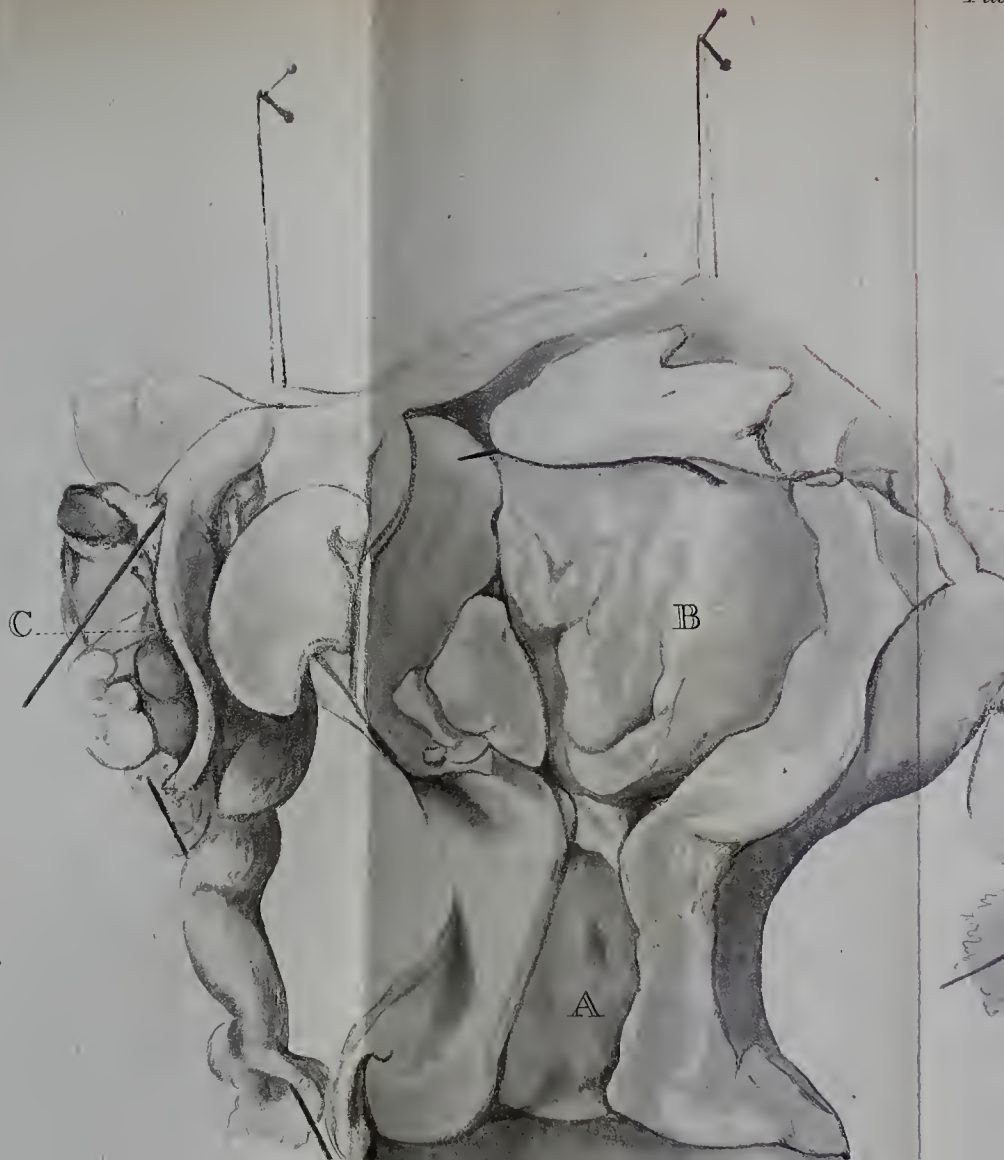
In hæmorrhages, which take place from parts exposed to the air, perhaps the mere exposure may have some effect, by stimulat-

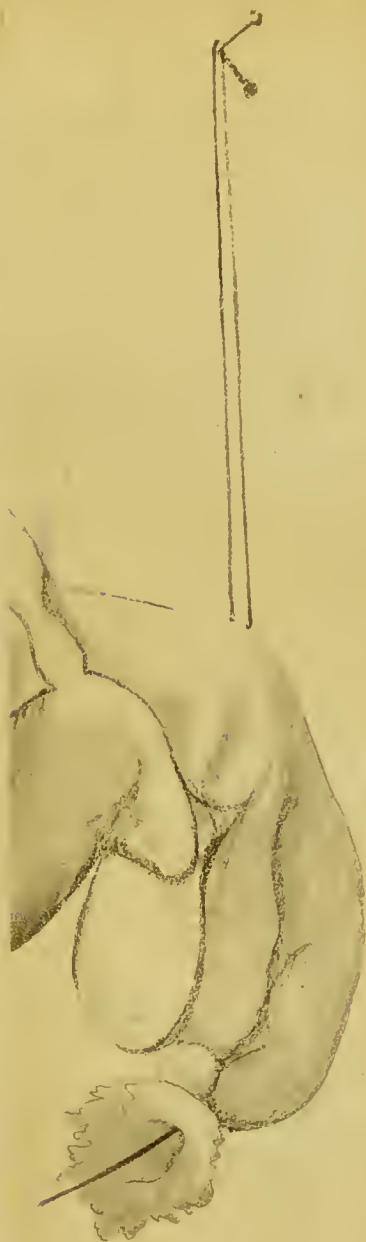
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ing the extremities of the vessels, to produce contractions of them, and so may restrain the loss of blood ; but in deep-seated parts, where the temperature is favourable to the relaxation of the vessels, the natural means of restraining hæmorrhage may be exerted with more difficulty, and therefore a larger quantity of blood will be lost than could be supposed possible from so small vessels. But this I offer entirely as a conjecture.

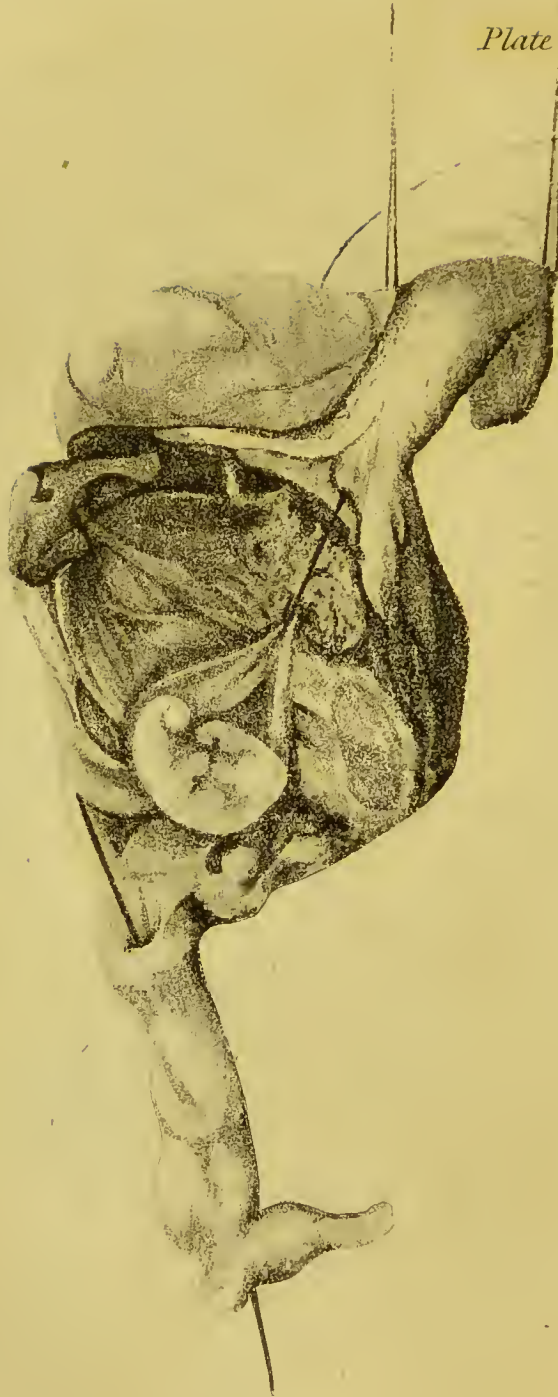
Upon the whole, the symptoms which accompanied this disease were such as could not have led any one to form a conjecture respecting the nature of it : and even if it had been known, we could only have deplored the insufficiency of our art to remedy a situation so uncommon and so fatal.





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Plate 8, p. 227.



EXPLANATION *of the* PLATES.

P L A T E VIII.

A view of the Fallopian tube, with the laceration in it.—The chorion and amnios are seen, the latter containing the fœtus.—The dark spots furrounding the chorion represent the coagula of blood formed at the extremities of the uterine vessels. The bristles are inserted in the two extremities of the Fallopian tube. The upper leads to the uterus; the lower to the fimbriæ.

P L A T E IX.

A front View of the Cavity of the Uterus.

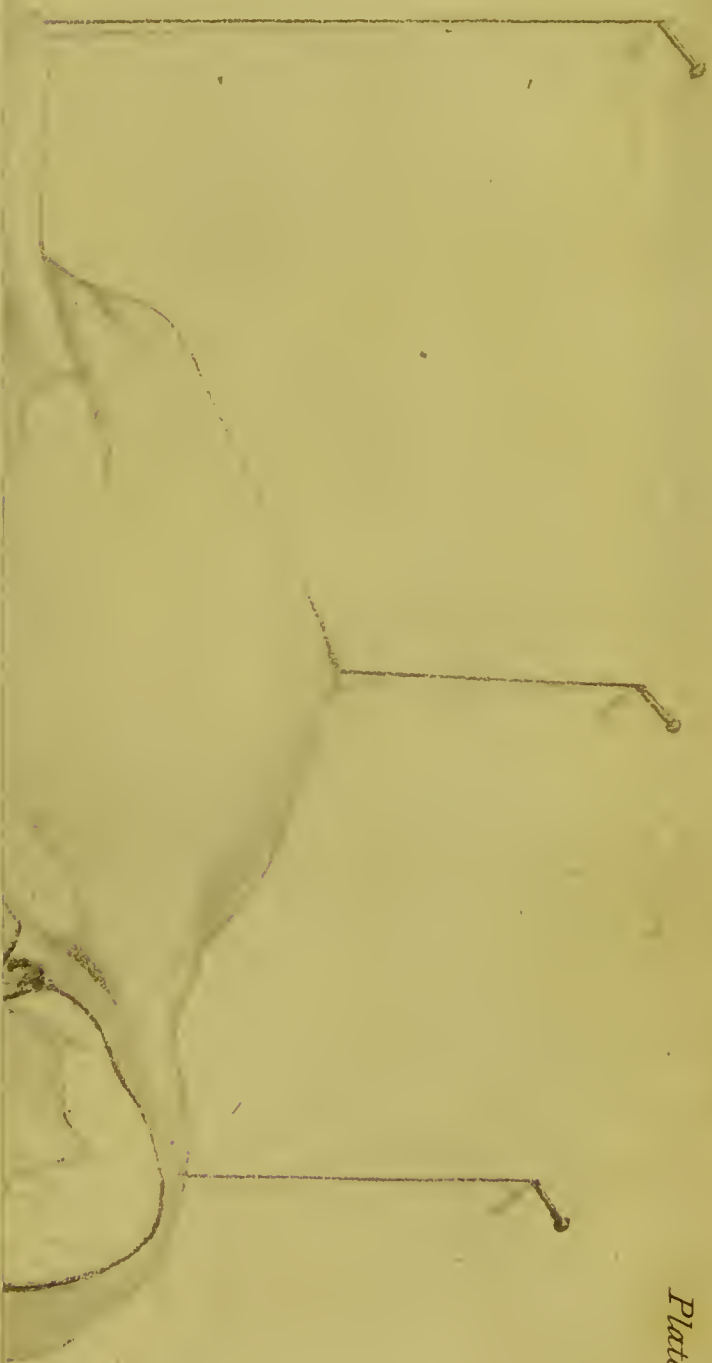
- A. The mucus in the cervix of the uterus, formed in consequence of pregnancy, which is with difficulty expressed in an engraving.
- B. The decidua, extending over the whole cavity of the body and fundus of the uterus.
- C. A side view of the rupture of the Fallopian tube, and the fœtus seen suspended in the amnios.

P L A T E X.

A back View of the Uterus.

- A. The ovarium cut open, shewing the corpus luteum.
- B. A side view of the laceration in the Fallopian tube, with the fœtus obscurely seen suspended in the amnios.
- C. A part of the cavity of the Fallopian tube seen through a cut made in its side, with a bristle passing through it.

Plate 10, p. 228.



XV. *Some Observations on the loose Cartilages found in Joints; and most commonly met with in that of the Knee.* By EVERARD HOME, Esq. F. R. S. and Assistant Surgeon to St. George's Hospital.

SUCH detached and moveable cartilages as are the subject of the following observations, are not peculiar to the joint of the knee, they occasionally occur in other joints of the body; but as they are most frequently met with in the knee, and it is in that joint they produce symptoms which render them the object of a surgical operation, I shall consider them more particularly when situated in that cavity.

These substances, in their structure, are analogous to bone, but in their external appearance bear a greater resemblance to cartilage; they are not, however, always exactly of the same structure, being in some instances softer than in others. Their external surface is smooth and polished, which, being lubricated by the synovia, allows them to be moved readily from one part of the joint to another, seldom remaining long at rest, while the limb

is in motion; when they happen to be in such situations as to be pressed upon with force by the different parts of the joint, they occasion considerable pain, and materially interfere with its necessary motions.

The circumstance of their being loose, and having no remains of a visible attachment, made it difficult to form conjectures respecting their formation; and I believe that no satisfactory account of their origin had been given, till Mr. Hunter's observations threw light upon the subject. The circumstances which led him to the investigation of this subject, appear at first sight so foreign to the purpose, that they require some explanation.

In the course of his experiments and observations, instituted with a view to establish a living principle in the blood, Mr. Hunter was naturally induced to attend to the phenomena which took place when that fluid was extravasated, whether in consequence of accidental violence, or other circumstances. The first change which took place he found to be coagulation; and the coagulum thus formed, if in contact with living parts, did not produce an irritation similar to extraneous matter, nor was it absorbed and
taken

taken back into the constitution, but, in many instances, preserved its living principle, and became vascular, receiving branches from the neighbouring blood-vessels for its support; it afterwards underwent changes, rendering it similar to the parts to which it was attached, and which supplied it with nourishment.

In attending to cases of this kind, he found that where a coagulum adhered to a surface, which varied its position, adapting it to the motions of some other part; the attachment was necessarily diminished by the friction, rendering it in some instances pendulous, and in others breaking it off entirely. To illustrate this by an example, I shall mention an instance which occurred in the examination of a dead body. The cavity of the abdomen was opened, to examine the state of its contents, and there appeared lying upon the peritoneum a small portion of red blood, recently coagulated; this, upon examination, was found connected to the surface upon which it had been deposited, by an attachment half an inch long, and this neck had been formed before the coagulum had lost its red colour.

This steeped in water, so as to become white, appeared like a pendulous tumor.

From this case it became easy to explain the mode in which those pendulous bodies are formed, that sometimes occur attached to the inside of circumscribed cavities, and the principle being established, it became equally easy for Mr. Hunter to apply it under other circumstances, since it is evident from a known law in the animal œconomy, that extravasated blood, when rendered an organized part of the body, can assume the nature of the parts into which it is effused, and consequently the same coagulum which in the abdomen formed a soft tumor, when situated on a bone, or in the neighbourhood of bone, forms more commonly a hard one. The cartilages found in the knee joint, therefore, appeared to him to originate from a deposit of coagulated blood upon the end of one of the bones, which had acquired the nature of cartilage, and had afterwards been separated. This opinion was further confirmed by the examination of joints which had been violently strained, or otherwise injured, where the patients had died at different periods after the accident. In some of these there were small projecting parts,
præter-

praternaturally formed, as hard as cartilage, and so situated as to be readily knocked off by any sudden or violent motion of the joint.

This opinion Mr. Hunter has mentioned for many years in his lectures, and his arguments in favour of it are so consonant to the general laws by which the operations of an animal machine are regulated, as scarcely to require further evidence: but the following case exhibits so many facts in confirmation of this theory, that it appears to me to afford a full explanation of the process abovementioned, and completely to establish the opinion.

A man, sixty-eight years of age, was brought into St. George's Hospital, on the 20th of March, 1791, with a simple fracture of the right thigh-bone. The fracture was situated about three inches below the great trochanter; it was treated in the usual manner, but no bony union had taken place in the beginning of June, about eleven weeks after the accident, the portions of bone at that time being readily moved on each other. There being nothing in the man's general health to account for this backwardness in the parts to unite, he was desired to explain

explain whatever circumstance he was acquainted with respecting himself, likely to throw any light upon it. This enquiry led the patient to mention, that his right os humeri had been broken three years and nine months before, but that the bones had continued disunited, and admitted of motion more freely at that time, than immediately after the accident.

Rest having proved ineffectual in producing union in the thigh, and it being evident, from the circumstance of the arm, that there was a natural backwardness in the constitution to form bony union, he was directed to walk upon crutches, and to press as much upon the broken thigh as the state of the parts would admit, without considerable pain, with a view to rouse the parts to action, forcing them by a species of necessity to strengthen the limb. In the course of a fortnight there was an evident firmness in the bone, and in less than two months the patient could walk with the assistance of a stick. As there was something uncommon in the case, he was allowed to remain in the hospital to acquire strength; in this convalescent state he was seized

seized with a complaint in his bowels, which was very violent, and carried him off.

After death the thigh-bone was found firmly repaired by bony union, but the bone of the arm, an account of which is more immediately to the present subject, admitted of motion in every direction at the fractured part.

The arm was carefully dissected, to examine the state of the fractured parts, between which there was no callus, but a large bag filled with a glary fluid, resembling synovia. The internal surface of this bag was smooth, like a capsular ligament, and its attachment to the bones was of the same kind: it adhered firmly to the surrounding parts, which were thickened and consolidated, rendering it very strong. The two ends of the bone were adapted to each other, all the irregularities having been absorbed, and their surfaces were of considerable extent, from the fracture being oblique; the upper one was slightly concave, or rather had two depressions, with a middle ridge; the lower one was smaller and rounded, and was adapted to both concavities, which received it in the different motions of the parts.

The surfaces of the bones fitted for motion were not completely covered with cartilage,
but

but studded over with it, and the bone was exposed in the interstices; a number of projecting parts, covered with cartilage, grew out from the surfaces, some exceedingly small, others large. From the edges of the bones and the capsular ligaments, these excrescences were larger, extremely irregular in their shape, broader in their attachments, softer in their texture, and serrated upon the external edge.

Thirty or forty small substances, similar to these above mentioned, were found loose in the cavity, varying in size from that of millet-seed to that of a barley-corn, of a roundish form, and smooth on the surface; the largest of them were more flattened, and serrated. Their hardness varied considerably, some of them being as soft as cartilage, others so solid as not to be pierced by a needle. Those bodies must have been originally attached, and broken off by the friction of the parts on one another.

The præternatural cavity which I have described, was in its nature and use similar to the naturally formed joints of the body; these excrescences and loose bodies were its principal peculiarities, the formation of which appears to have been the result of the violence committed

committed on the parts previously to the formation of the joint, and may be explained in the following manner.

When the bone was broken, the ruptured vessels poured out their contents into the interstices of the lacerated parts, for the purpose of uniting them again; this, however, not taking place, it was necessary to accommodate the parts to their disunited state, to this end the blood, which had now become useless, was in part absorbed, and the new joint formed. The remains of the coagulated blood, which had not given the stimulus for its own absorption, underwent changes in its nature, assimilating it as much as possible to that of the surfaces to which it was attached, in some parts its texture resembling ligament, in others being more allied to cartilage, or bone.

When we compare these substances with the loose cartilages found in the knee-joint, which are also produced in consequence of accidental violence, and similar in their appearance, we are naturally led to conclude that the latter originate from extravasations of blood, altered in its nature by the parts in which it is deposited, similar to those in the
artificial

artificial joint above described. In both cases they are evidently new formed substances, and the readiest mode by which we can account for their production, is to refer them thus to the blood, from which fluid every part of the body was originally formed.

These loose cartilages, as they have been commonly called, although they may occur in any joint of the body, are found most frequently in the knee; and in this joint, from the pain and inconveniences they produce, have become the object of an operation in surgery.

One or more of them may be formed in the same joint, I have known one instance in which there were three; they are commonly about the size of a horse-bean, often much smaller, and sometimes considerably larger; when very large, they do not give so much trouble to the patient as the smaller kind. A soldier in the 56th regiment has one nearly as big as the patella, which occasions little uneasiness, being too large to insinuate itself into the moving parts of the joint.

In this disease, the removal of the loose bodies is the only mode of relief; and it is fortunate for those who are afflicted with it,
that

that the knee-joint is the most favourable in the body for such an operation ; for the cavity extends a considerable way beyond the moving parts of the joint, and is continued into parts, which, when divided, will more readily unite than the common capsular ligaments, and be less liable to communicate the inflammation that comes upon the wound to the general cavity.

As these loose bodies cannot always be found, no time can be fixed for the operation ; but the patient, who will soon become familiar with his own complaint, must arrest them when in a favourable situation, and retain them there till the surgeon can be sent for.

Before the operation, the limb should be extended upon a table in an horizontal position, and secured by means of assistants ; the loose cartilages are to be pushed into the upper part of the joint above the patella, and then to one side, the inner side is to be preferred, as in that situation only the vastus internus muscle will be divided in the operation. Should there be several of these bodies, they must be all secured, or the operation should be postponed till some more favourable opportunity, since the leaving of one will sub-

ject the patient to the repetition of an operation, not only painful, but attended with some degree of danger.

The loose bodies are to be secured in the situation abovementioned by an assistant, a task not easily performed while they are cut upon, from their being lubricated by the synovia; and if allowed to escape into the general cavity, they may not readily, if at all be brought back into the same situation.

The operation consists in making an incision upon the loose cartilage, which it will be best to do in the direction of the thigh, as the wound will more readily be healed by the first intention. If the skin is drawn to one side, previously to making the incision, the wound through the parts underneath will not correspond with that made in the skin, which circumstance will favour their union. The incision upon the cartilage must be made with caution, as it will with difficulty be retained in its situation if much force is applied. The assistant is to endeavour to push the loose body through the opening, which must be made sufficiently large for that purpose; but as this cannot always be done, the broad end of an eyed probe may be passed under it, so
as

as to lift it out, or a sharp-pointed instrument may be stuck into it, which will fix it to its situation, and bring it more within the management of the surgeon.

The cartilages being all extracted, the cut edges of the wound are to be brought together, and, by means of a comprefs of lint, not only preſſed cloſe to one another, but alſo to the parts underneath, in which ſituation they are to be retained by ſticking plaifter, and the uniting bandage.

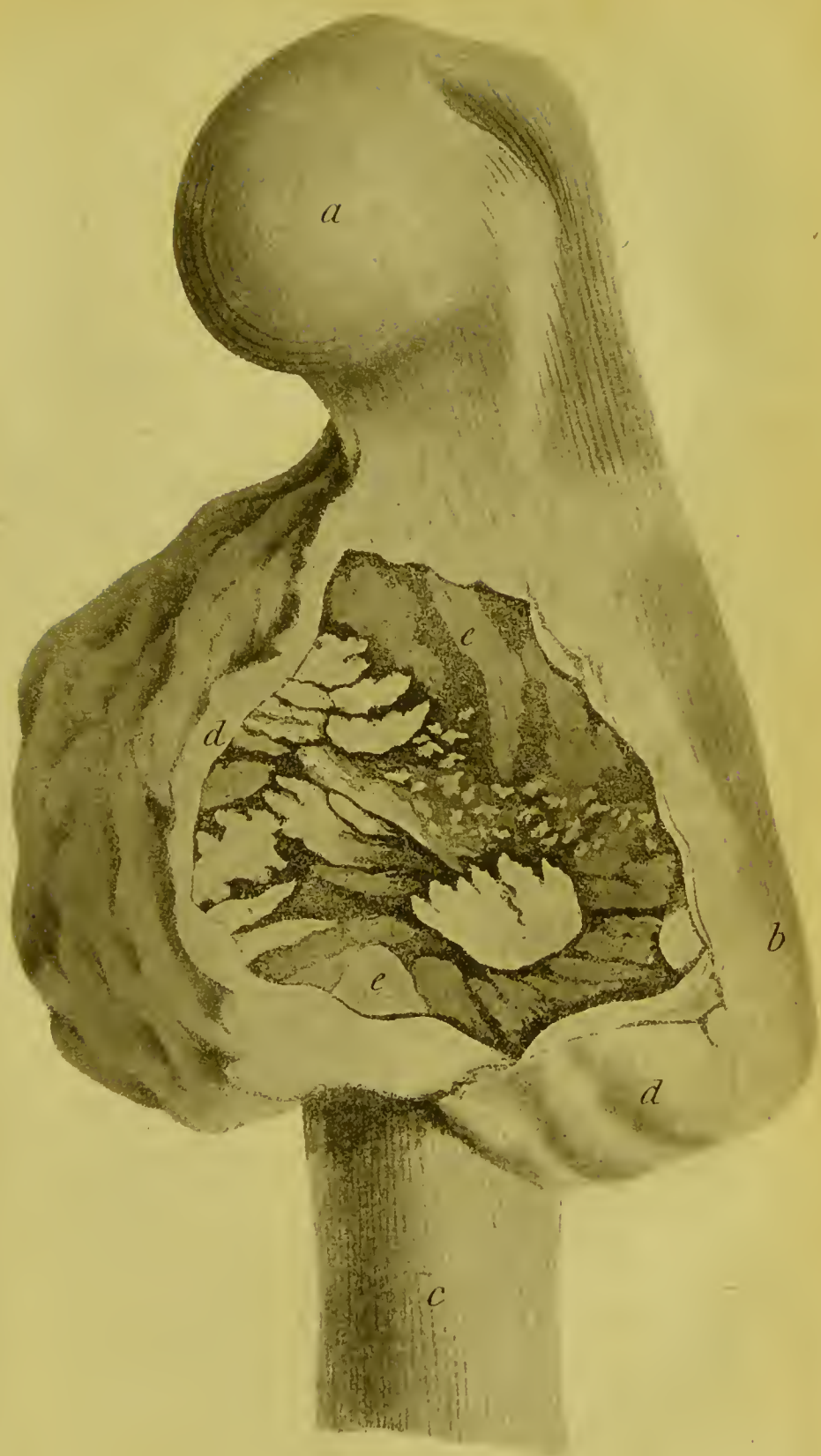
As union by the firſt intention is of the utmoſt conſequence after this operation, to prevent an inflammation upon the joint, the patient ſhould remain in bed with the leg extended, till the wound is perfectly united, or at leaſt all chance of inflammation at an end.

P L A T E X I.

A Representation of the artificial joint.

- a.* The head of the os humeri.
- b.* The fractured extremity of the upper portion of the bone.
- c.* The lower portion of the bone.
- d. d.* The newly formed capsular ligament surrounding the cavity of the joint.
- e. e.* The surfaces of the fractured ends of the bone, adapted to each other for the purpose of motion; the upper surface having two concavities, with a middle ridge; the lower one being rounded and convex, in some measure fitted to move in either of the cavities. Both these surfaces are partially covered with a substance similar to cartilage, in the interstices of which the bone is exposed.

From the surface of the bones arise a number of small hard projecting parts, very narrow at their base. From the inner surface of the capsular ligament there are excrescences of a softer nature, very large, serrated on their external edge, and attached by narrow necks. Many of these substances, both of the hard and soft kind, were found loose in the cavity, their attachments being broken by the motions of the joint.



XVI. *An Attempt to improve the Evidence of Medicine.* By GEORGE FORDYCE, M.D. F.R.S. *Fellow of the Royal College of Physicians, and Reader on the Practice of Physic in London.*

THE evidence on which medical knowledge is founded has hitherto been principally deductions from the practice of medical practitioners, made by themselves, and communicated to the public. The cases themselves from which these deductions were made have seldom been published; and when they have, they have principally been of extraordinary diseases; and these have commonly been stated, with a view to some particular point, in such a manner that they cannot be brought as evidence sufficiently accurate to be depended upon.

The following scheme is intended to make the evidence in cases more compleat, by dissecting them, placing the progress of each particular symptom by itself, and shewing its connection with, and the relation it bears to, the other symptoms of the disease.

If a perfect scheme of this kind was formed, and if a case was taken correctly according to it, it is clear that such a case would bring into view the whole of its evidence; and that a compleat collection of such cases would form a perfect body of medicine as far as it is known. The result would be, that we should get rid of that variety of opinion which pervades the whole of the science; and our opinions would be grounded on the solid foundation of observation, and not float, as driven by the mere caprice of practitioners.

A second effect a perfect scheme of this kind would produce, is putting the evidence which is brought in any case in a true point of view; and showing what is still wanting to make it conclusive.

In this country it is the usage frequently to employ practitioners who are considered as of less note at the beginning of a complaint; and afterwards, if he should not be thought capable of conducting, or if he should not cure the disease, another is sent for, as supposed of greater skill. I do not mean to argue the propriety of this usage; but as it exists, it often happens that this second practitioner can obtain very little authentic evidence

dence of what went before in the disease, by which he can judge of it. It is meant as another advantage of this scheme to point out to these practitioners the things they ought to take notice of: and if they fill up the columns of this scheme at the time, good evidence will always be ready both to themselves, and to any other practitioner, of what has gone before in the disease.

The things to be considered in a disease are divided in this scheme into those which happen before, or at the time when, the disease takes place; and the things which happen in the progress of the disease.

The things which happen before, and at the time of the attack are placed in horizontal columns; and under these the things which happen during the progress, in perpendicular columns.

The things which have happened before and at the time of the attack are not afterwards changed; reciting them once therefore is sufficient.

Those things which happen after the attack are constantly changing; all these are to be enumerated in the order they arise, and therefore must often be repeated. These

points are attained by placing them in this order, as is evident from inspection of the scheme.

The first of the horizontal columns is the climate in which the patient lives at the time of the disease. In which we are to remark,

1st, The part of the globe where it lies.

The evidence of science ought to be permanent; but towns and kingdoms are fluctuating, therefore the longitude of a place should be taken from some part of the earth which is remarkable, and is likely to continue. The latitude is not liable to any error from any fluctuation that can happen for many ages.

2dly, The exposure to the sun.

3dly, The winds which usually prevail; and the state of the atmosphere they produce.

4thly, The situation for height compared with the adjacent country, and above the level of the sea.

5thly, The nature of the soil in regard to its moisture and dryness; and the situation with regard to rivers, lakes, or marshes.

6thly, The qualities of the waters used by the inhabitants, and the quantity they are supplied

supplied with ; as that will often point out the means by which the parts of the food not used, as well as all other putrescent substances, are carried off.

7thly, The temperature of the atmosphere.

8thly, Any particular effluvia, or other matter contained in the atmosphere in consequence of the largeness of a town, mode of living of the inhabitants, mineral effluvia, &c.

9thly, The structure of the houses.

10thly, The modes of living of the inhabitants, by which is meant the usual manners and customs of the inhabitants as to food, drinks, sleeping, dress, exercise, and employment of time, which often gives light into the nature of diseases in every part of the community.

As an example I have endeavoured to describe the climate of London.

London, latitude $51^{\circ} 31'$ north, longitude $5^{\circ} 16' 23''$ west from Greenwich, $5^{\circ} 16' 23''$ east of the opening into the Mediterranean from the ocean. The town is large for an European town, being in a body about five miles in length, and three in breadth, besides a number of rows of houses lining each side of the roads going out from it. A mile is 1691,

6485 lengths of a pendulum swinging seconds. The greatest part of the town is situated on the north side of a river called the Thames. The ground on which this part stands is an hill, which rises with a quick ascent from the bank of the river, and then gradually, although unequally, to the north west, which is the most elevated part. The river on the south side is confined by an artificial bank, the ground on that side being flat; but the water does not stagnate in the ditches, being kept in motion by the tides. On this side stands a considerable part of the town called Southwark, in a body near a mile both ways: above this there is at present only a small line of the town on the south side of the river. London reaches along the river side to the west, until the river leaves the bottom of the hill and turns to the south. Above this the river is confined between artificial banks on both sides, and is lined with houses till it runs through two old towns, Westminster and Lambeth, consisting mostly of ruinous houses, exclusive of the river, about a mile in length and breadth.

London is furrounded, besides the houses which line the roads, with many large villages;

lages ; especially from the west by the north to the south-east.

The river Thames runs through a valley upon a bed of gravel, and probably clay under it, for many miles above and below London. The valley is bounded on both sides by hills not exceeding four hundred feet in height. Where the river runs in the middle of the valley, it is secured by artificial banks on both sides, which have lasted longer than the memory of history, extending in all more than thirty miles. These banks, when the river washes the bottom of the hills on either side, are only continued on the opposite side. When not encreased by either rains or the tide, the river is about a quarter of a mile broad, not more than twelve feet deep, and now and then in very dry seasons it has been forded by horses. The tide in this river rises above fifteen miles higher than London. At London it rises at spring tides from twelve to fourteen feet. The water is very pure some miles above the town ; near the town it is mixed with mud, and contains a sufficient quantity of mucilaginous matter to putrify. When preserved in casks it purifies itself by putrefaction, and remains afterwards more
pure,

pure, but it never putrefies sensibly in the river, nor in the cisterns in which it is sometimes kept for a few days for use. At the lower part of the town it contains a little sea-salt when the tide is at its height; but this does not reach to the middle of the town. Its specific gravity is the same with that of distilled water. The inhabitants are supplied with this water, which is pumped up by several engines, principally worked by fire, into their houses.

The town is also supplied with water by an aqueduct, which is brought from more than twenty miles distance from the north, through a canal of about sixty miles in length. The water of this aqueduct is also pure, and unless when heavy rains bring down clay, it is bright and clear, and does not putrefy on keeping. Its specific gravity is also the same with distilled water. This water, as well as the other, is carried in wooden pipes under the streets into the houses of the inhabitants.

There are springs found on digging every where in the town, which might yield large quantities of water. These were formerly used, but are now little employed, because the supply from the Thames and New

River is much cheaper. The waters of these springs contain a small portion of sea-salt, and a larger quantity of magnesia vitriolata, so as to be sensible to the taste, and so as in some places to act as a purgative. They also contain gas; sometimes in quantity sufficient to give them briskness, and render them agreeable to the taste.

Rain water is never used, being always very impure from the dust floating in the air, and lying on the tops of the houses.

The whole supply of water from aqueducts and engines is 109,440 cubic feet in an hour.

The valley through which the Thames runs is gravelly, generally dry, and not marshy till about a mile below the town, the water in the river being confined between its banks.

The hills, or risings, on which the principal part of the town stands, are mostly a mixture of clay and sand; the sand or gravel generally being in rather the largest proportion. In some places the soil is gravel.

The winds from south-west to north-west, and from south-east to north-east are the most prevalent. The westerly winds blow over the great Atlantic ocean, passing before they reach London over part of Great-Britain for about

two hundred miles, and over Ireland when they veer to the north. They are generally moist, although much drier than when they arrive at the west coast of the island. The barometer is generally low when they blow. They are commonly most prevalent in February, September, November and December. The easterly winds blow over the large continent of Europe: they are always dry. The barometer is high when they blow. They are most prevalent in January, March, and the beginning of April. They are cold, except sometimes when they blow in July and August, while the westerly winds are almost always warm, except in November, if they verge to the north.

The heat of the air is very variable, seldom remaining equal for many days; and every year differing entirely from the preceding ones, not only in heat, but also in moisture, and rain. Sometimes the winter is severely cold, with frost from November till May with little interruption; sometimes the water is not frozen for more than ten or twelve days. Most commonly there is a little frost in November and December, but otherwise these months are usually very foggy and moist.

The

The principal frost generally is in January; February is commonly a mild, open, moist month. March is generally cold and dry. The summer months vary as much; sometimes there are three months very warm, sometimes not more than a week; the latter half of July is commonly the hottest. In August heavy rains often fall, especially in the last half of the month. The thermometer sometimes rises to above 80° of Fahrenheit's scale, very rarely to 86° ; but the most common summer heat is from 65° to 75° : it sometimes falls in the winter to 15° ; it has been known to fall below the point marked 0, but very rarely. The most common winter heat when it freezes is between 20° and 30° ; the most frequent when it does not freeze between 40° and 50° .

The air when dry is always loaded with, and often obscured by dust, which consists of ashes and soot arising from pit-coal, the fuel which is commonly burnt; horse dung produced, and ground to small powder by the numerous carriages drawn by horses, with which the streets are always crowded; powder of granite and flints, which form the streets and roads, and are ground extremely
fine

fine by the wheels of the carriages. These powders, with various others, penetrate the houses every where, and undoubtedly enter the trachea, adhere to the surface of the lungs, and not uncommonly produce cough, with difficulty of breathing, in people on first coming from the country.

The streets are generally wide; few of them so narrow as to prevent two carriages from passing, and many of them wide enough to allow five or more to pass, especially in new parts of the town, which form more than half of it; they are from sixty to twenty feet wide, those of great communication seldom less than thirty, in the old part of the town; in the new part most of them are not less than forty. In several places there are squares of a considerable size, i. e. from about 100 to 1000 feet square. The streets are well paved, and clean, notwithstanding the immense quantity of horse dung constantly falling upon them.

The houses, except most of those in the oldest part of the town, which are not more than a fourth of the whole, have a story sunk under the level of the street. This contains the kitchen and other offices. Below the level

level of the bottom of this story a covered canal is dug under the street, with which there is a communication from the houses, and by which putrescent matters sufficiently fluid are carried off. Ashes, bones, &c. are conveyed away in carts twice a week. The greatest part of the houses are of an uniform structure; in each story a large room in front, a smaller room and the staircase occupy the back part, and there is frequently a smaller room added behind. There are commonly four stories besides the one under the level of the street.

The town is fully inhabited; there is hardly a house unoccupied. The number of inhabitants is very little known: calculations of various kinds have been made by many authors; but these have been founded on elements entirely conjectural, and are therefore of no use. As far as my own opinion goes, and nothing better than opinion can be formed in this case, they are about a million. They consist of classes living in very different manners.

The first class includes those living on their paternal fortune, or riches suddenly acquired, comprehending a few merchants. The women
men

men of this class live almost constantly in their houses, which are very close, although the rooms are spacious, and the whole house perfectly clean and neat, or in carriages, with no labour and little exercise. This gives them a delicacy in their appearance hardly to be described. As a flower brought forward by the cherishing heat of a conservatory, where it is defended from the nipping winds, exceeds any thing produced by nature alone, like it they too have a tenderness of constitution, which subjects them to disease from the slightest exposure to any cause. Their situation, however, prevents them from being often exposed to infection or sudden cold, which are the great causes of violent disease in this metropolis. Their complaints therefore are generally slight, and very irregular; nor can they bear medicines in any way of a rough nature. Their disorders must therefore be touched with the slightest hand. This has often produced an imbecility of practice, not only in London, but throughout the kingdom, which first infects the medical people who are immediately employed in the disorders of this class. Although there may sometimes perhaps be found one or two
among

among these who are not the most learned or judicious practitioners, yet they are the richest, which contributes not a little to the spreading of this infection. Notwithstanding the diseases of the women of this class are frequent, yet they are seldom fatal, so that they often live to a great age.

The men of the first class are much in the air in the morning, and use exercise. They live in the country part of the year, when they are often occupied in hunting and shooting. With some exceptions, they are of constitutions sufficiently strong, are seldom diseased; their diseases are strong and marked, and they bear the operation of powerful remedies.

The men who are menial servants of this class, like the domestic slaves of the ancients, are idle, lazy, use little exercise, none when they can avoid it; they are thus rendered irritable, and being often exposed to all the inclemency of the weather, in the winter season often till three or four o'clock in the morning, they are exceedingly subject to disease, particularly of the thorax; and few of them attain to any great age, except those of the higher ranks.

The women servants resemble in their constitutions their mistresses.

The clergy are fewer here than in almost any other country in Europe. They are very apt to be affected with hypochondriacal complaints, perhaps from an idea that they do not occupy their proper rank in life. Being in general regular in their manner of living, they often attain to a great age.

The lawyers who are occupied in business, are often, from their great attention and labour of mind, weak, and disordered in their *primæ viæ*. Those who are not employed, may be considered as in the same state with the independent gentlemen.

Physicians are so few, that it is hardly worth enumerating them. There are not much above two hundred in all, and not near half that number are employed in practice. Except when they are cut off by infectious fevers, before they are habituated to infection, although often diseased, physicians generally attain a considerable age.

Attornies and apothecaries are to be considered in their manner of life and constitutions in the order of tradesmen.

Merchants

Merchants and traders of consequence form the next class. The women of this class live a regular life, going to bed generally before midnight, and rising about nine in the morning. Most families have villas near town, where the women pass much of their time, especially during the summer season. They are much more in the air, and consequently have neither the delicacy nor the irritability of the class we have first enumerated, enjoy a much better state of health, their diseases are more regular, and they bear the action of powerful remedies. Of the men of this class, some lead a sedentary life, their time is much employed in writing, generally leaning on their breasts, such are subject to complaints in their primæ viæ; others of them use exercise, especially on horseback, and often sleep in the country: all of them in point of eating are luxurious.

The lesser tradesmen, shopkeepers, and manufacturers, are also sober and regular in their manner of life; but they are much confined to their houses, especially the women of this class, which renders them irritable and subject to disease, often violent and fatal. Nor is that part of the men whose business calls

them abroad less subject to morbid affection, so that they rarely attain to great old age.

The last class consists of the working part of the manufacturers, and labourers of all denominations; who, with some exceptions, are the most disorderly, profligate, debauched set of human beings perhaps in the whole earth; working hard, and being dextrous in their occupations, and of course earning large sums of money, which they spend in drinking, exposing themselves at the same time to the inclemency of the weather; always idle while they have any money left, so that their life is spent between labour and attention above their powers, and perfect idleness and debauchery. Their women, also passing from affluence to distress almost every week, are forced, although soberly inclined, to lead a very disorderly life. Pulmonary complaints are more particularly common and fatal in this class, as well as all other diseases.

London is fatal to infants in general. On a comparison of charity children sent to be nursed in the environs, with those nursed in town, it appeared the loss in town, being thirty-nine, was only twenty-nine in the same number and time in the country. But if this loss is

great

great altogether, it is tremendous among the lowest class, the mothers being almost always obliged to labour for their bread, and often even robbed by their husbands, have no time left to take the care necessary for the rearing of infants, so that they are often left to wallow in dirt, notwithstanding the general disposition to cleanliness in this country; and can never receive that exercise, or purity of the air, which is requisite; nor can their food be at all attended to. Add to this, a pernicious practice of continuing to give them suck for even two or three years, by which they hope to prevent their having charge of many children. This pernicious practice goes even to some mothers of the ranks above this; while mothers in the higher ranks refuse the natural sustenance to their infants, leaving them often to the care of strangers, regardless of motherly affection. From all these causes, the loss of children in London is more than one half before they attain the fifth year of their age.

The second horizontal column in the scheme, is marked the precession of the seasons, or the course of the preceding seasons.

This column is meant principally as one ground of investigating the causes of epidemics.

It is well known that the same species of disease sometimes rises and spreads through a town, a whole country, nay over a whole continent at one time ; rages with violence for a certain period, and afterwards ceases : when this happens, we say the disease is epidemic. I do not mean to enter into the whole history of such diseases, but only to observe that the different states of the human body arising from the temperature, moisture, &c. of the atmosphere in which a man has lived for a length of time, renders him subject to particular diseases often more than its present state. The inhabitants of the same town, nation, or even continent, sometimes are exposed to the same peculiar states of the atmosphere, and the constitutions of the inhabitants in general are therefore rendered equally susceptible of being affected by the causes of the same disease. If such causes, therefore, should be generally applied, the diseases will be universal, or epidemic, over the whole country. If the causes should be partially applied, the disease will be epidemic in that town or country
where

where they are so applied ; and if they be applied no where, the epidemic will not arise, notwithstanding the predisposition.

For instance, dysenteric purgings are often brought on in the autumn by the moisture and coldness in that season ; but in other autumns equally cold and moist, dysenteric purgings do not happen in the same number. In some they are epidemic in an high degree, in others they hardly appear: It is not, therefore, the state of the atmosphere at this season that is to be looked on as alone producing the epidemic ; for this would not have taken effect if the preceding summer had not given the predisposition. Hot and long summers produce disposition to dysenteric purging. Our summers sometimes begin in April, and continue till the end of August, with unequal, but sometimes great heat through the whole ; at other times they do not begin till the middle of June, and end in the beginning of August, the heat hardly at any time reaching to 70°. In the last case there are hardly any dysenteric purgings in the autumn, but in the first they are very frequent and violent, especially if the cold and moisture of the autumn come on suddenly or by fits. But al-

though the summer be hot and long, these purgings do not appear if the autumn be dry and warm.

How far we are to carry our research into preceding seasons is difficult to say; I think I have noticed effects from three years back. The years 1779, 1780, 1781, for instance, were years in which the summers were long or very hot, at the same time the winters were mild. It is well known that living in warm air gives predisposition to intermitting and remitting fevers. At the beginning of these three years such fevers were very rare, and hardly to be met with; they began to appear in the second, and were very frequent at the end of the third, so that I took thirteen of them at one time into St. Thomas's Hospital, and these had arisen in the environs of London, and we were never without many cases of this disease *.

The course of former seasons may be taken from journals, which are often kept with great care. Where they are kept by any public body, it is no way necessary for a practitioner to keep them himself. A clock would keep

* Many cases of people with intermitting fever come to the London hospitals from marshy parts of the country.

them the best if Mr. Cummins's principle were adapted to the thermometer, quantity of rain, &c. as it is to the barometer, which might easily be done.

By marking the course of the preceding seasons, it is probable that great light might be thrown on the decline of diseases, as well as their spreading; but it must require a long time before much advantage will be gained.

The next column contains the present state of the atmosphere, which ought to be marked not only at and before the attack, but throughout the disease. This is difficult, on account of the various things to be attended to, many of which cannot be referred to public or private journals or clocks. The weight of the atmosphere may undoubtedly; the general moisture may also. The wind, which is of consequence in this respect, that particular winds in particular countries have peculiar effects. The east wind, for instance, is in this country a drying wind, and produces cold by dissolving moisture, so as to be felt in the bed-chamber of a patient in rheumatism, &c. as is well known. The purity of the air cannot be judged of by any thing external to the chamber in which the patient is, if he be confined

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to his bed or bed-chamber, with any degree of accuracy. Methods have been found lately of ascertaining the quantity of pure air contained in the atmosphere, but these methods shew the pure air to be in as great quantity in the atmosphere of a ward of an hospital, where the infection is in the most violent degree, as on the banks of a stream murmuring over pebbles in a gravelly soil.

It does not seem to be the quantity of pure air contained in the atmosphere that is to be sought after; but the various substances intermixed. In the same manner as it is very different to the drinker of water, whether he drinks it with a dust of plain sand or arsenic.

The marks of purity in the atmosphere in a room, or rather freedom from noxious vapour or powders, or small drops of liquid matter, are very obscure. A felon brought into a court of justice, apparently in perfect health, has, from his cloaths or person, sent out such a quantity of noxious matter, as to infect half the persons present with violent fever. Yet the men nearest him, nor in any other part of the court, have been sensible of the least smell, taste, feel, or any other sensation whatsoever; so that unless it had hap-

pened more than once, or even if it had not happened frequently, no man would have suspected that the disease had arisen from that cause. Just as when the venereal disease first broke out, no person suspected that it arose from coition, but from some malignity of the air. The nuns therefore in Paris, in order to avoid this infection, were not close shut up in their convents, but houses were fitted up for them in the country, out of the infection of the air of the town.

The purity of the atmosphere from infectious or noxious matters in the bed-chamber of a patient, must be taken from various circumstances, which our present knowledge can give but little direction about. I have often seen a person already infected and attacked with fever, go through a fever with as mild symptoms in a room where there were several people ill of the same disease, as another who was kept in the purest atmosphere that could be procured. Yet if several persons who had entered the room had been seized with fever, we might determine that there was febrile infectious matter. We are, therefore, to take the purity of the atmosphere where the patient is, more from the closeness and size
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of the room, current of air, &c. but the subject is not so far investigated as to be capable of being farther gone into. The heat of the atmosphere of the room is of material importance to be noted, both for the present government of the practitioner, and for the evidence of the disease. Heat in medicinal effect is not by any means to be judged of by the thermometer alone in the atmosphere in which the patient at present is. There must be taken into consideration the temperature he has been lately accustomed to. When, therefore, we say the air in a room is warm, we cannot fix to that idea the name of a degree in the thermometer. In winter in this country, 60° of Fahrenheit's thermometer is warm, or rather hot; in summer 73° is a moderate temperature. In other countries it is different. There are places in India and Africa, where 90° in certain seasons of the year is cold. Having first ascertained what is generally felt warm at several seasons in a year, we may then refer it to the thermometer. In London in the cold season 55° is warm, and in summer 73° , varying in other seasons between these two points. It is not here proper to enter into the effect of hot and cold
atmo-

atmospheres on diseases. I shall only mention one instance. In acute rheumatism in winter, if the heat be 60° we shall rarely have much metastasis, while many shall happen if it be 45° or 50° .

Physicians in all ages have been of opinion, that it is of great advantage to attend to the epidemic diseases which prevail, not only because it is useful in cases of the epidemic itself, but because the same causes which influence the body so as to make it subject to that particular disease, render it liable to be affected in a peculiar manner when any other disease takes place. I might ground, therefore, this column upon the authority of Hippocrates, Sydenham, and various other physicians of great weight. But perhaps it may be useful to make some observations to determine what particular epidemics are more necessary to be noted.

First then, there are certain infectious diseases that become epidemical. These may arise from an infection which produces a disease, which, when it has once happened, does not recur during the life of the person, such as the small-pox. In this case it may be, that a community has guarded itself against the
disease

disease so long, that a great number of persons are liable to the infection. Numerous cases of such disease may arise on this account, if the infection should be by any accident introduced into such community, although there be nothing in the air or the course of the seasons, or any other circumstance, which renders men in general at that time more apt to receive the infection; such a disease becoming epidemic in this manner is not of much use to be noted in this column, as it will not govern in any degree any other disease. But it frequently happens that infectious diseases, whether they recur but once or oftener in the same person, arise and spread at times through a community which has not been guarded against them, or but negligently, as in London, where there is always small-pox, and other such infectious diseases, which recur but once, yet sometimes they spread themselves much more universally than at others, and the same thing happens in the plague, for the more perfect history of which physicians are much indebted to Dr. Russel, and in other diseases which recur in the same person more than once. When this happens, there must be some peculiarities produced in
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the bodies of men in general, which renders them peculiarly liable to be infected. These peculiarities may have considerable influence on any other disease that may arise, but they have not been hitherto investigated with any degree of precision. It is, however, the object of this scheme of disease, to bring out evidence, and therefore such epidemics should always be noted.

Another set of epidemic diseases, arising from causes that are very commonly applied, are not infectious, therefore the disease only arises more frequently in a community at a particular time, because the bodies of men in general are influenced so as to be more easily affected by such causes. Thus in the spring the bodies of men are rendered subject to phlegmonous inflammations, in the autumn to dysenteric affections.

Or there may be diseases which may arise either from infection or without any infection, such as the erysipelatous sore throat, often called the putrid or ulcerated sore throat, which is undoubtedly an infectious disease, but which likewise arises often where there can be no kind of suspicion of infection. These certainly become epidemic from their
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being peculiarities produced in the bodies of men of a community, which renders them subject to be affected either by infection or any other cause. In these cases of epidemics almost every disease incident to the human body is more or less influenced by the peculiarities which occasions the epidemic affection, and therefore such require very particular notice.

The next column is meant to point out the temperament of the patient. Hippocrates conceived that there were four humours in the body; blood, bile, black bile, and phlegm: hence men, according as one or other of these humours abounded, were said to be of a sanguineous, bilious, melancholic, or phlegmatic temperament. This doctrine pervaded the whole of Greek medicine, and continued through the Arabian during the reign of the Abassides, and came, with other Greek and Arabian medicine, into Europe. The modern knowledge of the fluids of the human body, shews that the doctrine which treated of these fluids was without the smallest foundation. But it often has happened, that appearances and differences have been really marked by physicians both in health and disease,

case, and have been described in words which were only applicable to the hypotheses of the causes on which they were supposed to depend. Although these hypotheses are not true, yet the appearances which occasioned their formation are perfectly grounded. There does, for instance, exist in certain men, born, bred up, and living in all the circumstances of others of the same community, a disposition to phlegmonous and general inflammation. Those who have this disposition, have likewise their diseases influenced by it, and have been said to be of a sanguineous temperament. There are others in whom perfect regularity takes place in all their diseases; disposition to regularity is also evident in their natural functions. Such have been said to be of a bilious temperament. Others there are in whom there is great irregularity both in health and disease; these have been said to be of a phlegmatic temperament. In others there is a degree of intractability in all their diseases, as well as in what happens in their healthy state; these have been said to be of a melancholic temperature. It would require a much longer dissertation than can be allowed here, to point out the various pas-

sages in the works of practitioners, to shew that this was what produced the idea of temperament. A physician, whose practice is in any degree extensive, must be very inattentive not to see clearly these differences, which, however, run into one another in all kind of variety. It is much to be wished, that the antient names for them were abolished; in the specimen, therefore, I have not used the term phlegmatic temperament. But whether these antient names may be used, or whether new ones are to be substituted, or general description is to be given, it is a matter of great consequence to be noted, as it often governs many circumstances in the disease. As for example: we should expect in the small-pox, even before the eruption, a great degree of general inflammation during the time of the eruption, if a man had great disposition to phlegmonous inflammation; but if the patient should be subject to irregularity in natural things, we should expect that the disease, when the eruption took place, would exhibit watery pustules, foreness, great frequency of the pulse, and the other symptoms of a disease which I have called, in the Elements of the Practice of Physick, symptoms of irritation.

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Besides these differences in the constitution of the body, which have been marked by physicians in almost all ages as nearly general among mankind, there are in particular habits peculiarities, which have been called *idiosyncrasy*, which may have influence in a great degree on the appearance of disease, and the effects of medicines. I have known, for example, many instances where the pulse, instead of going on regularly, has been very irregular; in several cases without any other irregularity it has intermitted, and yet all the functions of the body have been carried on perfectly. Persons have been affected by opium, purgatives, and various other medicines, in a manner totally different from the effects which they produce in mankind generally: Such circumstances often tend to mislead, if they are not known; therefore, form the next horizontal column.

It is sufficiently evident that it is necessary to note the usual manner of living of a patient previous to the disease, as it has not only an influence on the disease itself and its appearances, but forms also a ground of practice. For example: if a man had been accustomed to drink a large quantity of wine in

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health,

health, if he should be seized with a fever, and that fever go on till the strength be much exhausted, wine might be exhibited in considerable quantity; while if a man who drank no vinous liquor in the ordinary mode of his living, had an equal quantity exhibited to him, he would be intoxicated. Although the fashion of some practitioners at present is to keep patients in fevers intoxicated with wine, in as far as I have been able to judge, the practice is very detrimental. So if animal broths are to be exhibited in fevers at any time, it certainly would be more pardonable to prescribe them to those who have been much accustomed to live on animal food, as is the case of the inhabitants of this country.

In the mode of living the points to be considered are, the kind and quantity of food and drink which is made use of. The times of using food and drink. The defence from, or exposure to, the weather. The quantity and times of sleeping. The degree and times of exercise.

The mode of living will therefore form the next horizontal column.

The next column of those containing things to be marked previous to the disease, I have called

called times and contingencies. These are, in the first place, the age of the patient.

It is not of great consequence to mark the exact age, that is, the exact number of years a man has lived; but great changes take place at different periods. The first period may be considered as happening for the first nine months. The second from the end of that time, to the end of the fifth year. During the whole of both these periods, while children are subject to particular diseases, they are remarkable for the irregularity which takes place in all their diseases. The next period is from five to fourteen; the most healthy of the whole life-time of man, provided the small-pox, and other such infectious diseases, which happen but once, are either gone through before, or do not occur till afterwards, and provided also that there is no scrofulous disposition in the child. From fourteen to twenty-eight is the next period; during this time there is inflammatory disposition in men, and to women it is a very trying one. From twenty-eight to forty-five is again an healthy period. From forty-five to sixty is to be considered as the next; and

after that time the system is wearing out very fast.

In this column the state of the menstrual flux is also to be noted, as well as any disease the patient has formerly been afflicted with ; since diseases have influence, in many instances, on those which follow them, as an intermittent will occasion a subsequent fever, even after years, to break down into an intermittent of the same type, as I have seen in several instances. Lastly, any accidental circumstance is to be set down.

The last thing to be noted before the taking place of the disease, is the application made to the system which gives occasion to the disease, and which is its occasional cause. It may be an application to any part of the body, or to the mind. The knowledge of the occasional causes of diseases is of great consequence for the preservation of health. In so far it does not constitute a part of the history of a particular case of disease, therefore has reference to the science of medicine in general. The knowledge of the occasional cause is often also of great use in pointing out the treatment of diseases, in as far as the
maxim

maxim that the cause being removed the effect will cease, is true.

The knowledge of the occasional cause of disease is extremely difficult, and in many cases by no means as yet ascertained. The difficulty arises from various causes. The first is the uncertainty of the action of every thing upon the human body, both causes of diseases and remedies. We have seen, for example, as in the case at the Old Bailey during Mr. Nash's mayoralty, a felon bringing infection with him into a court of justice, which produced fever in a great number of those assembled in the court, while those affected sat promiscuously in every part of it with those who escaped, and there was no human means of distinguishing any difference in the constitutions of those infected and those who escaped. That a man, therefore, has been exposed to an occasional cause of disease who has not been affected by it, is no proof that that particular application is not an occasional cause of that disease: yet this argument has been held by many practitioners of great eminence. Sir J. Pringle, for example, affirmed that the cloaths of a man being moistened with water while he wore them, was not a cause of catarrh or rheumatism,

because many men, even whole regiments of troops, have had their cloaths wet while they wore them, without either catarrh or rheumatism arising. Nevertheless it is certainly true, that I have seen more than two hundred patients at least, who, when in perfect health, on having had their cloaths moistened while they wore them, were seized immediately with catarrh or rheumatism, when there was no other the least apparent cause of the disease applied. On the other hand, it is equally fallacious to suppose, that any application to the body, if followed immediately by a disease, was the occasion of it. If, for example, a man, after drinking a glass of water, should be immediately seized with a fit of apoplexy, it would not follow from thence, that the apoplexy was occasioned by drinking the water. But if a disease should be found to follow immediately upon any application made to the system in a great number of cases by one practitioner, who was the only one who had access to see such application made, there would arise a considerable degree of probability that it was the cause of the disease. If more practitioners than one had had occasion to see such application made, and found that the disease immediately followed,

lowed, the probability would increase. It would increase the more if these practitioners had had no communication with one another; and it would come almost to a certainty, if it had been observed by many practitioners during many ages, although the disease did not arise more than once in ten, twenty, or even an hundred times that the application had been made. Such, however, has the inattention to accuracy been, that many occasional causes which produce diseases immediately, are rather admitted from common consent than from such evidence as I have pointed out.

In the next place it happens undoubtedly, that in many cases the occasional causes of disease do not operate immediately, but the person appears in perfect health for some time before the disease comes on. As in the small-pox, after catching the infection, there is undoubted proof of the patient's continuing apparently and actually in perfect health before the disease takes place. Here the difficulty increases in an immense degree. It is true, indeed, that such diseases as never arise except from one well known cause, such as the small-pox, and some other infectious diseases, have that cause well ascertained even when it

is

is not understood in what manner it operated before its effects became sensible. But in other cases, where a disease arises from many causes, it becomes extremely difficult to ascertain the application which has actually produced it. This has been the origin of greater confusion in medicine than any other circumstance whatever: for a practitioner, in relating either a single case, or the result of his experience in disease, has generally taken no manner of notice how long it was from the application of the supposed cause to the beginning of the disease. It is, therefore, a strict rule, that in filling this horizontal column, it shall be set down exactly how long it was after the application of the supposed cause before any morbid appearance was perceived in the system.

When a disease arises some time after its cause has been applied, it is clear that that cause must have produced some alteration, which became a cause of the disease. The conjectures with regard to this alteration, have formed the greatest part of the fallacies, hypotheses, and confusion in medicine, they being almost entirely from conjecture, and not observation. It is, therefore, high time that these should be laid aside, and the intermediate

appearances, from the application of
 e to the appearance of the disease,
 only be noted. Perhaps it may not
 loading this dissertation, already too
 give one instance. Sudden exposure
 certainly produces disease in many
 The diseases which it produces have
 en for granted to arise some times at
 e from the time when the cold was
 l, and in this case it has been sup-
 from the matter of the insensible per-
 being obstructed, accumulated, noxi-
 l capable of producing disease; like-
 t it did actually produce diseases by
 ous qualities. Now of all this there
 e smallest evidence.

e things are to be observed with re-
 the evidence of the actual causes of

There is another circumstance to be
 l to; the effect which the cause pro-
 if the application of it be continued
 the course of the disease: for some-
 ne cause continuing, is the occasion of
 tinuance of the disease. In this case
 xim is true, that *causa dempta tolitur*
 e as if a thorn be run into the flesh

C A S E I. Mrs. L.

Climate	London
Precession of the seasons	two very long and cold winters, followed by summers also cold, but mild autumns, particularly the last.
Present temperature	
Epidemics	frequent inflammations of the skin, or red eruptions, sometimes accompanied with erysipelatous sore throat, sometimes without; they particularly affected
Temperament	rather small in stature, and delicate. Her pulse in health small and weak, and easily rendered frequent.
Peculiarities	
Mode of living	as women of a middle rank; regular as to hour of sleeping.
Times and contingencies	aged 29; menstrua regular, not much in quantity; had been married four years without being pregnant; she had been affected two years before with a r
Occasional causes	none apparent.

1787			day of disease.	Pulse.	Skin.	Heat by the Thermometer under the tongue.	Heat feel of the patient.	Heat on touching the skin by the physician.	Muscles.	Eyes.	Tongue.	Mouth & throat.	Respiration.	Stomach.	Food and drink.	Intestines.	Urine.	Sleep.	Miscellaneous.
Jan.																			
6 p. m.	12	F.	1									began to feel the uvula.		appetite not lost	refrained from animal food				excepting uvula no c
	13	S.	1 & 2	between 80 and 90			not hot					throat sore	natural	appetite lost	tea and water-gruel	natural evacuation in the morning	not observed	disturbed	felt general
	14	Sun.	2 & 3	about 100			not hot				foul	sore, red, and beginning floughs	rather affected	sick	beef-tea, barley-water, &c.	no evacuation	ditto	very little, drowsy	
	15	M.	3 & 4	about 110			hot				fouler	floughs increased	not much affected	nausea	the same	evacuation in the morning	ditto	the same	
2½ p. m.	16	T.	4	124	dry	105	hot	moderate	in no ways tense	dull	a thick yellowish brown mucus formed a triangle, the base	flough of an ash colour covered the whole right tonsil, round	not perfectly easy from the affection of the throat	nausea, which she ascribes to the medicines	sago, panada, &c. with wine, lemonade	evacuation as usual in the morning	somewhat of a whey appearance	dosing and drowsy	I saw her this disease

blood of a person affected by fever, from that of a man in perfect health, as far as has hitherto been made public, except that in some cases of violent fever it does not coagulate so firmly, the red particles are broken down, and there is an evident tendency to putrefaction, even so as that there are instances upon record of its being fœtid. But this putrefescency of the blood is the effect of the depression of strength, for it happens only where there is previous great depression of strength; and when such depression arises in any other case, the same progress towards putrefaction is always observed.

There are diseases, in which the disease once produced, goes on without any cause at all, as the motion of a mass of matter being once produced, the mass would continue to move on if in free space.

In the next place it is to be observed, that this may be the case where the causes produce a disease immediately on their application, and also when the occasional cause produces an effect, which effect is or is not a disease itself, but the cause of the disease finally produced.

I shall

Climate										London									
Precession of the seasons										three very cold and long winters, a very warm beginning of the spring, but two cold months from a north-east wind cold for the season									
Present temperature										in different parts of the town different diseases were more frequent. In the part where the patient lived, violent fevers and dysentery									
Epidemics										bilious strongly marked; complexion brown; strong blackish hair; judgment accurate; determination great; habits fixed									
Temperament										none									
Peculiarities										free but equal, dined at the same hour, five; eat heartily; drank a bottle of port after dinner; no supper; used much exercise									
Mode of living										aged thirty-five; not married, but does not abstain from women									
Times and contingencies										sat no with a friend who died of a violent fever a fortnight before the attack									
Occasional causes																			
1787.				Pulse.	Skin.	Heat Therm.	Heat feel of pat.	Heat Touch.	Eyes.	Tongue.	Respiration.	Præcordia.	Stomach.	Food.	Drink.	Intestines.	Sleep.		
June.	27	W.	11	130	very dry and contracted, & of a dusky colour	105	very cold	cold except in the palms and mouth	unmeaning	white mucous covers it	very difficult	tense	nausea	he had lived as usual before the attack		regular			
	4 p. m.																		
	1 p. m.	28	Th.	111	contracted, not so dry, more of a dirty yellowish colour.	102	very hot	hot, and in the palms of the hands burning	a stupid stare	more slimy	relieved	still tense	nausea gone off, no nausea	no solid food	only barley-water	had two evacuations in the night	a little confused		
	noon	29	F.	112	nearly the same	103	the same	the same	not altered	the same	the same	the same	no appetite, but medicines and drink agree	as before		no evacuation	confused and short sleeps		
	3 p. m.	30	S.	106	same	104	complained much of the heat	not so burning	insolent	browner	frequent	the same	no appetite without nausea	as before	was purged twice	passed the night with great restlessness, little and broken sleep			
July.																			
	8 p. m.	1	Sun.	112	dry and contracted.	105	violent	burning	more confused	more covered with mucus, a little brownish	the same	not so tense	as before			no evacuation	had rather a better night		
	noon	2	M.	104	moist, and not much contracted	101	not very great	milder	somewhat more sensible.	still covered with a dry brownish mucus	not very uneasy	not tense	the same	fruits, boiled barley, pease, potatoes	small beer, barley-water, not heated	natural evacuation this morning	very confused the first part of the night, slept afterwards		
	2 p. m.	3	To.	6	nearly the same	103	same	rather more pungent	again more confused	the same	the same	the same	the same	the same	the same	no evacuation	short and restless throughout the night		
	1 p. m.	4	W.	7	dry and contracted	100	great	not very pungent	more confused	dry, and browner fur	more difficult	tense	as before	the same	the same	one evacuation this morning	none till four, fine that time broken		
	3 p. m.	5	Th.	8	not quite so contracted	104	not so considerable	the same	the same	the same	not so difficult	tension less	as before	the same	the same	no evacuation	short and broken through the night		
	noon	6	F.	9	dry, and very much contracted	105	the patient is not sensible enough to judge	not so pungent, except in his palms	very much confused and wandering	the same	very difficult	not very tense, but some tension of the abdomen	cannot judge	the same	the same	two copious fecid stools	hardly any		
	2 p. m.	7	Sat.	10	not so dry	103	the same	the same	the same	still darker brown	not so difficult	the same	no nausea	the same	a little wine added	no evacuation	very much disturbed and not more than half an hour at a time		
	9 p. m.	8	Sun.	118	very dry, and very much contracted	105	very delirious, and not able to explain	very pungent	unsteady	very dry, and somewhat glazed on the surface	frequent	great flatulency in the intestines, and tumor of the abdomen	does not reject mucus	the same	milk and water for drink added to barley water	a copious and very fecid evacuation	had a better night		
	1 p. m.	9	M.	12	not very dry or contracted	102	very delirious	not pungent	a little stupid	no fur, but a very glazy surface when dry	not much disordered	continues the same	the same	the same	the same with a little more wine, a pint in 24 hours	the same	none, but great delirium till five, slept or dozed a little afterwards		
	2 p. m.	10	T.	13	moister	100	the same	the same	very stupid	the same	the same	flatulency more considerable	the same	the same	the same with beef	two copious fecid evacuations	dozed the whole night.		

It is well known that almost all the ancients, that is to say, the Greek physicians, have counted days in disease, as well as the Arabians, most of the moderns, the Chinese, and indeed almost all nations in whom the study of medicine has made any tolerable progress. Yet few authors have considered when a medical day begins. It is true, that almost all have taken the period from the sun's passing the meridian to the time of its next passing the meridian, as the length of the day, which is unequal. It seems however, notwithstanding, to be received with universal consent, that this inequality is not to prevent our considering this period as the length of a medical day. But the time of the beginning of the day is a point which, for accuracy, should have been ascertained from the first. Supposing two fevers in different persons to begin at eleven o'clock in the forenoon on Sunday: in one of these the crisis takes place on the Sunday following, at eight o'clock in the morning, and in the other at two o'clock in the afternoon; if we count according to the ordinary reckoning of days, both crises would happen on the eighth day of the disease. But

if

if we begin the day at the time of the attack of the fever, then that crisis which took place at eight in the morning, would be on the seventh day ; and that which took place at two, would be on the eighth. Therefore, unless this point be previously determined, every thing about critical days is thrown into confusion. Perhaps there should be two modes of counting the beginning of medical days ; one from the commencement of the disease itself, whatever time of day it took place, which seems to have been adopted, and is proper, as far as I can judge, in pure phlegmonous inflammation, not attended with fever *. But in the human body a natural evening attack of fever is sensible in all mankind, even in the most perfect health, and this begins at five o'clock in the evening ; therefore that hour, in many diseases, must be accounted the beginning of a medical day.

It would lead into a dissertation far beyond my present purpose, to lay down the observations from practice and contemplation of the

* It is to be observed here, that I do not mean by fever, heat, and frequency of the pulse, but what is often called simple fever, and by Dr. Cullen fever strictly so called.



Climate

Precession of the fers also cold, but mild autumn

Present temperatur

Epidemics sometimes accompanied wit

Temperament health small and weak, and c

Peculiarities

Mode of living eeping.

Times and conting had been married four years

Occasional causes

1787

Jan.

6 p. m. 12 F.

13 -S.

Tongue.

Mouth &
throat.

Red
ti

began to
feel the
uvula.

throat
fore

nate



restlessness and delirium,
he knows nobody

℞ aq. menth. fati. ʒj ss. cast.
russ. in p. trit. gr. x. tinct. opii
gutt. viij. sach. alb. ʒj. spirit.
cinnam. ʒj. m. ft. haust sextis
horis sumendus. Repet. enem.

perstet in usu medicamen.

perstet in usu medicamen.

st part of the night was
with extreme difficulty,
with hardly any expecta-
f the patient's living till
orning, from the extreme
ty and delirium

perstet in usu medicamen.

great difficulty the at-
ts can be restrained from
him more wine

perstet in usu medicamen.

works of medical authors, to give the reasons why I fix on five in the evening, much more so to enumerate the diseases in which the time of the first attack of the disease is to be accounted the beginning of the day and the diseases, in which five o'clock in the evening is to be considered as the beginning of the day.

There is another circumstance with regard to the beginning of disease, which is observed by De Haen, to wit, that it happens in certain diseases, as in fever for example, that some slight flying appearances take place before the actual attack of the disease, from whence its beginning is to be counted. It is also very necessary to pay attention to this circumstance.

Observations on the Cases inserted in the Scheme as Examples.

It is to be observed, that in one case with which the scheme is partially filled up, there is a column marked the mouth and throat, which is a variable column, and is reserved for the appearances which take place in a part of the body, if that part should be the seat of the disease.

One of the cases, which I have selected as an example, may be considered as not proper, on account of its not being fully described; but I chose to take one less perfect, because it often happens that the history of the first part of a disease cannot be procured.

I did not see the patient at the beginning of the disease, therefore could only take the first days from report. I also chose a short disease, as not having it much an object to draw off the attention to the disease itself from the general view of the plan. I have also laid before the society a case of fever more full, and I have many others in the same state. I have another reason for choosing the first case as a case of erysipelatous inflammation, in order just to observe, that although many practitioners in this town are well acquainted with the use of cortex cinchonæ, generally called Peruvian bark, in erysipelatous inflammation, yet the knowledge of its virtues in such inflammations is not general. It is not of much consequence who has made any invention in the science of medicine, for the satisfaction arising from being able to relieve distress by the application of a new medicine, or one already known in a new manner, or for new purposes, is a sufficient recompence.

I do

I do not mean, therefore, to dispute the priority of the application of this medicine with any person who shall consider himself as the inventor of it, I only mean to show by what progress I have brought it in evidence that it is the most powerful remedy in erysipelatous inflammation. By erysipelatous inflammation I mean inflammation of the skin when it is only inflamed, or inflammation of the surface of an ulcer where the very surface only is sore and inflamed; or inflammation of the mucous membrane, when there is little secretion from the mucous glands. It was in the year 1759 that I first applied this bark in the quantity of an ounce in twenty-four hours in a phymosis, where there was much inflammation of the skin of the whole penis, having observed this kind of inflammation to be increased by evacuants. The disease gave way in less than forty-eight hours. Afterwards, in the year following, I just came to see my friend Dr. Balfour Russel die of what is called the putrid sore throat, or sore throat attended with ulcers by Dr. Fothergill. Dr. Fothergill attended him from the beginning of the case, along with his brother. Struck with the inefficacy of the treatment by stimulants used in this case, and at the same time know-

ing from many cases I had seen (for at that time I had applied myself for ten years particularly with a view to medicine) that the evacuations by bleeding, and other anti-phlogistic treatment, was very improper, I conceived that in this species of erysipelatous inflammation likewise, Peruvian bark in large quantities might be employed with success. I used it in the first case I met with of the disease, and with great advantage. As the disease was not uncommon, I had several opportunities of seeing its effects, which I found always successful, and ventured accordingly to extend its use to other cases of erysipelas, such as happen frequently in the face, and often in other parts of the body. I was so far convinced of its power, that I ventured to recommend it to my pupils, and publish its use in the erysipelatous sore throat in my Elements of the Practice of Physic, although with that diffidence a young practitioner should observe in the introduction of any new practice. In the year 1771 I was chosen physician to St. Thomas's Hospital, where there is great opportunity of ascertaining the efficacy of medicines in all diseases. Here I have had an opportunity of verifying to myself as well as to my present colleagues, that in all

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cases

cases of erysipelatous inflammation which are pure, that is unmixed with phlegmonous inflammation, or increased secretion from the mucous glands, even in some cases of the latter intermixture, Peruvian bark is the most powerful remedy that can be employed, and is almost always successful. It should be exhibited in substance if the patient's stomach will bear it; and in this disease it will almost always bear it, and in as great quantity as the patient's stomach will bear, which is commonly to the quantity of a drachm every hour.

I believe there are many practitioners in this country who still adhere to the treatment of erysipelatous inflammations, and those of the mucous membrane when pure, by bleeding and other evacuations, which I have always found hurtful; and I do not think the use of Peruvian bark is at all known abroad, excepting in gonorrhœa, from the chapter of my Text-book on the Lues Venerea being translated for the use of the students in some of the medical schools in France *. This practice requires only to be tried to convince any one of its utility.

* Montpellier and Grenoble.

XVII. *Observations, and Heads of Inquiry, on Canine Madness, drawn from the Cases and Materials collected by the Society, respecting that Disease.* By JOHN HUNTER, M. D. F. R. S. and Physician to the Army. At the Desire of the Society.

THE society having collected many cases, and other valuable information, respecting hydrophobia, or canine madness, it is judged that a short abstract of the result of their inquiries would not be unacceptable to the public. It will shew the present state of our knowledge respecting that very extraordinary disease, and, it is hoped, be the means of suggesting improvements both in its prevention and treatment.

I. *Of the generation of the poison.*

It would be of great importance, if we could ascertain the manner in which the poison producing canine madness is generated. For should it appear that it did not arise spontaneously among dogs, but was communicated by infection, as the small-pox is in
the

the human species, it would then be possible either intirely to eradicate the disease, or greatly check its progress, by regulations similar to a quarantine. The following facts, though they will not prove that the disease never arises spontaneously, yet are sufficient evidence that it is most commonly the result of infection. Dogs are more numerous in the island of Jamaica, than perhaps in any part of the world. It is the ambition of every negro to be master of a dog; yet notwithstanding their great numbers, particularly in the towns, forty years have elapsed without a dog being known to go mad. The insular situation of the country secures to it, in some degree, the advantages of a quarantine; and the rare occurrence of the disease proves that it seldom, if at any time, originates of itself. The length of the voyage from this country to Jamaica is such, that it would scarcely be carried in the dog kind from Great-Britain, for in them the disease generally proves fatal in three weeks; but North America is much nearer, and it is from that quarter, when the disease has made its appearance, that it has been suspected to come.

The most eminent sportsman * in this country, to whom the preservation of his kennel from madness was an object of great importance, has, for many years, preserved his dogs from the disease, by making every new hound perform a quarantine before he was allowed to join the pack. From these facts we may safely infer, that the disease, if not always, yet certainly in the far greater proportion of cases, even among dogs, is communicated by infection.

II. *Of the symptoms of the disease in the dog kind.*

From the above considerations we are naturally led to an investigation of the disease as it shews itself in dogs, in order that it may be known early, and with certainty, and prevented from spreading, by the confinement or death of the animal.

Dogs suffer a change in their natural manners, and become dull and heavy. They grow peevish and snappish, and are easily offended. They rather take offence at such things as come across them, than run in

* Mr. Meynell.

search of objects to attack them ; yet they are more apt to quarrel with strange dogs, and to run after such domestic animals as they have been used to hunt, as fowls and hogs. In this state the dog still minds the call of his master, and can be restrained by him ; but, as the disease advances, he disregards him, appears not to know him, and will bite him if he is near him. It is probably about this period of the disease, when his recollection of persons is nearly obliterated, that he strays from home, and follows any path or road he happens to meet with, seemingly without purport or design. In this state he only bites or snaps at such animals as come in his way, giving apparently but little attention to external objects, so that it is easy to avoid him. If he be confined in this advanced stage of the disease, he bites and gnaws every thing near him ; is furious for a moment when approached ; and his chops are covered with tough frothy saliva. With these symptoms he soon expires. Before death there are swellings about the throat, and also of the tongue in some cases. He can swallow both solids and liquids during the whole disease, and readily eats what is offered him.

him. He has no fear of water, for he never avoids it. It is said that dogs know, and avoid by instinct, one that is mad; and there appears some foundation for this opinion: for dogs of superior courage and strength have been known to run, after the first encounter, from those that are mad, as if struck with horror.

There is probably some variety in the disease, as it shews itself in dogs; one out of twelve or fifteen that were bit, and all died, had no marks of wildness or fury about him, never offered violence to any thing near him, and expressed pleasure at the sight of his master, by shaking his tail; a little before he died.

The progress of the disease in the dog is, in general, very uniform, yet it would appear to admit of exacerbations and remissions in some degree; for a dog, after leaving home, will return again; and, after being enraged at his master, will become submissive.

There is no circumstance that contributes more to spread the disease, than the disposition which the dog has to leave home, and wander about; and, on this account, all stray dogs should be approached with caution, and never with familiarity. It is a remark deserving

deserving the most serious attention, that, in a large proportion of the cases collected by the society, the infection was communicated by taking familiar notice of strange dogs.

III. *What animals communicate the disease.*

All domestic animals, birds, as well as beasts, are susceptible of the poison of the mad dog; and, indeed, our experience has not yet taught us that there is any race of animals exempted from its effects. Whether every animal labouring under the disease is capable of infecting others, or whether this power is confined to a few only, we are yet to learn.

The disease has been communicated to the human species by dogs, cats, wolves, and foxes. The dog, the wolf, and the jackal, have, by the late inquiries of naturalists *, been ascertained to be of the same species; and therefore it is probable, from analogy, that the latter is capable of communicating the infection as well as the two former. The fox also has a strong affinity to the dog, and is by Linnæus counted of the same *genus*; but the

* Mr. Hunter's paper, Phil. Transf. vol. lxxvii. page 253.

distinctions of natural history will not avail us here; for the cat, an animal of a very different *genus*, has often produced the hydrophobia in the human species. Many other animals are reported to have the power of infecting others, by biting them while labouring under the disease themselves; but the facts hitherto collected are very vague, and lead to nothing conclusive on this head. Were we to judge from analogy, from seeing two animals so different from each other as the dog and the cat, capable of infecting others, we might be led to infer, that every animal susceptible of the disease had the power of communicating it, provided their natural habits led them to bite and tear with their teeth such animals as came in their way while in an enraged state. But, though there are instances of men labouring under hydrophobia biting some of those employed in taking care of them, no ill consequences have been known to follow. From this, however, we can draw no positive inference, for it is but a small proportion of such persons as are bit by dogs undoubtedly mad, who are infected with the poison.

The bite only serving the purpose of inoculation, the danger arising from it will be various,

various, as it happens to be in a part more or less vascular; or as the teeth are more or less loaded with the poison. There is the greatest danger from bites in the face, and the symptoms come on soonest; bites in the hands also, which are generally bare, are full of danger. In other parts of the human body the cloathing, by wiping the teeth, greatly lessens the danger of infection. The bite is not essentially necessary for the application of the poison: a dog, by licking a sore, produced the hydrophobia; but he licked it till it bled, so that the poison came in contact with the newly divided blood-vessels. This circumstance, if we may judge from the analogy of other poisons, is probably of importance in giving efficacy to the poison, yet it is not clear that it is essential; for there are two cases of the disease mentioned in the Philosophical Transactions *, which arose from putting the hands in the mouth of a puppy that was mad, but when there was no bite; and there is a similar case in the † Memoirs of the Royal Academy of Sciences of Sweden. It is true, various other modes of infection are narrated by writers, but in all of

* Phil. Transf. vol. xxiii. p. 1074.

† Anno 1777.

them there is much appearance of fabulous credulity. There is good reason to think that tetanus has sometimes been mistaken for hydrophobia, and given rise to the accounts of the diseases proceeding from the bite of a cock, the claw of a cat, and similar histories.

Dogs are much more susceptible of the infection than the human species. Four men and twelve dogs were bit by the same mad dog, and every one of the dogs died of the disease, while all the four men escaped, though they used no other means of prevention but such as we see every day to fail. There is also an instance of twenty persons being bit by the same mad dog, of whom only one had the disease.

There is a question which naturally presents itself here; does the disease ever arise spontaneously in the human species? The facts relating to this question involve many doubts. Francis Stannier * died in November 1787, with the symptoms of hydrophobia, though it was not known that he had ever been bitten by a mad dog; and similar cases are related by writers. Yet as a large bite is no way necessary to communicate the infection, the patient abovementioned may

* London Medical Journal, vol. ix. p. 256.

have been slightly bit, without knowing it, as he was often drunk, and frequently in the streets at night. There is good reason to believe that the difficulty of swallowing, which sometimes occurs in tetanus, has been mistaken for hydrophobia in some cases; and there may be other spasms about the throat and the œsophagus, which may so far resemble hydrophobia, as to give rise to errors on this subject. Something of this kind occurred once to Dr. John Hunter, in an hysterical woman. Were we to be guided by analogy in deciding the present question, we should be led to deny the existence of spontaneous hydrophobia; for where is there an example of any of those diseases which depend upon a specific poison, as the small-pox, the venereal disease, or the measles, arising spontaneously? But the full decision of this question must be left to future experience and observation.

IV. *Effects of the poison on the human species.*

In observing the operation of the poison upon the human species, we find, that from the time of the bite till the disease appears, there is no derangement of health, nor any

perceptible change in the constitution, provided the person bitten be not under the influence of fear. The effects of that passion have, in some cases, been so great as to produce an imitation of many of the symptoms of the disease *; the patient actually imagining that he could not swallow, and suffering all the horrors of extreme despondency, till it has been discovered that the dog was not mad by which he had been bitten.

The wound has nothing to distinguish it from the bite of a dog which is not mad, and heals as soon; there are almost always, however, pains in and about the wound, and sometimes swelling, and even a fresh discharge from it, shortly preceding the hydrophobia.

The interval between the infection and the appearance of the disease, varies from thirty-one days to seventeen months, in the cases laid before the society. The most common period appears to be about forty days. There is a case given in the Philosophical Transactions, in which the symptoms appeared nineteen months after the bite †. The disease is

* Vid. Philosoph. Transf. vol. xliii. p. 257.

† Ibid. vol. xl. p. 5.

reported to occur sometimes in a few days, as four or five, after the bite; but such cases have something doubtful in them, and are probably to be referred to tetanus, or some other convulsive disease *.

The pains and disagreeable feelings about the part where the wound was, are generally described as passing towards the head or heart, and the hydrophobia follows soon after. The dread of swallowing liquids, though the most singular symptom of the disease, and from which the name has been given to it, constitutes but a small part of the malady. It is true that none, or very few, recover who have this symptom, yet they certainly do not die in consequence of the difficulty of swallowing liquids; for the human body could easily exist double the time in which the disease usually proves fatal, without food or drink. But the sick can often swallow substances that are nourishing in a pulpy state, without, however, having their life prolonged from it. It is not, therefore, the difficulty or impossibility of swallowing liquids, but the effects of the poison upon the constitution at large, which occasion death.

* Vid. Medical Transf. vol. ii. p. 222.

The usual progress of the symptoms is as follows: the slight pains about the wound are soon succeeded by great depression of spirits, anxiety, restlessness, extreme sensibility to all impressions, and great difficulty, or an utter impossibility of swallowing any thing liquid. This last symptom is generally discovered accidentally, on attempting to drink, and, after a few trials, is accompanied with such horrible sensations, that any thing which afterwards recalls to the mind even the idea of drinking, excites violent agitation and inexpressible aversion. Of the sick who are more composed, and can, therefore, better describe their own sensations, some say, that, upon attempting to swallow a mouthful of any liquid, they feel something rising from the stomach which obstructs the passage; others tell you, that they have a sense of choaking or suffocation; and it is very observable, that the attempt to pass the liquid over the root of the tongue, excites convulsions in the larynx and pharynx, and even in the muscles of the chest and abdomen. They complain of no pain. There are, moreover, watching, inquietude, a countenance expressive of extreme misery, and fits of great irritability and almost fury, from

trifling causes, as the sick themselves readily allow, and even wonder at when more composed. There is often a sense of great oppression at the breast, which the sick generally call a difficulty of breathing, but it is properly the *anxietas præcordiorum*, which probably is an affection of the heart; for they sigh often, and make deep irregular inspirations, and find some relief from motion, as running and walking, which shew the lungs not to be the seat of the oppression.

The extreme sensibility of the sick to all impressions, appears in the displeasure they express at even the air blowing upon them; in their dislike to a strong light; in their aversion to new faces, or even the sight of their friends and relations; and in the terror they express at being touched, which almost threatens to throw them into convulsions.

As the disease advances, the mind is more filled with dreadful fears and apprehensions; the fits of fury become both more frequent and more violent, and misery and horror are more deeply marked upon the countenance. The saliva grows thick and ropy, and would appear to be secreted in larger quantity. The miserable sufferer, not daring to make the

smallest attempt to swallow it, spits it out incessantly, which he does with much vehemence and difficulty, and with frequent retchings and vomiting. What he brings up is a little phlegm, tinged with brown or yellow bile. In this state the slightest cause excites convulsive tremors all over the body. They sometimes call out they are suffocated, turn black in the face, and expire in convulsions. It is not uncommon, however, for the strength to sink suddenly, the patient to become quiet and calm, as if nature gave up the struggle, and to die without a groan.

The pulse in the beginning is not quick, nor is the skin hot; and there is none of the muscular debility so remarkable in fever; but in the progress of the disease there is some feverish heat, and, as death approaches, the pulse becomes extremely quick and tremulous.

The duration of life from the appearance of the hydrophobia till death, varies from thirty-six hours to four or five days; the most common period is from two to three days.

There is considerable variety in the symptoms; they are more or less violent, and in proportion prove fatal in a shorter or a longer time.

time. The hydrophobia, or dread of swallowing liquids, is in very different degrees: in some cases the patient can not only make the attempt, but even force down a mouthful or two; in others, the first approach of any thing liquid for the purpose of drinking, excites the most violent commotion in the whole frame.

There is no part of the disease that admits of greater variation than the degree of mental derangement, which in some does not amount to more than extreme irritability and impatience; while in others it rises into fits of the most violent rage and fury, in which they bite and tear themselves, and every thing near them. This difference would appear to depend a great deal upon the natural temper and disposition of the mind.

The disagreeable feelings in the wound are described by the sick sometimes to pass towards the head or body, and when they reach those parts they produce head-ach, or pain in the breast. In some, though rarely, there is a considerable degree of fever. There are instances of the sick having attacks of fits a good deal resembling epilepsy. Priapism is a symptom of the disease in some cases.

It sometimes happens that all the symptoms admit of remissions and exacerbations, and that with some degree of regularity. Under these circumstances the virulence of the poison would appear to be somewhat lessened; and it may be a question, whether the disease does not at times shew itself in a milder form, as in the case described by Morgagni †, and in some of the patients of whom the late Dr. Garden communicated an account to the society.

It deserves to be remarked as a singular thing in the operation of a poison so destructive to life, that it affects the muscular strength but little. In two cases the panting and difficulty of breathing, as the patients called it, were remarkably relieved by running; one of them found himself relieved by running round Smithfield, which is nearly a quarter of a mile, a few hours before he died.

V. *Dissections.*

Many examinations of the bodies of those who have died of hydrophobia have been communicated to the society. An appear-

† De Sedibus & Causis Morborum, epist. 61. §. 14.

ance has in general been seen on the inner coats of the stomach, near the cardia, similar to what is found in the bodies of persons who have had slight inflammation, that is, a greater number of red vessels with small streaks of red blood. In some instances there has been an increased vascularity of the *pia mater*, or slight watery effusion on the surface of the brain. In some dogs that died of the disease, the appearances upon the inside of the stomach were similar to what have been already described; but there was no unusual fullness discovered in the vessels of the brain, or its membranes. These appearances are no ways adequate to account for the symptoms of the disease.

Morgagni*, though he has not himself examined the body of any that has died of this disease, yet has collected the observations of his friends, and compared them with such as are to be found in medical writers. In no particular do they agree; and the change in the human structure upon which the disease depends, would appear to be beyond the reach of anatomical investigation.

* De Sedibus & Causis Morb. epist. 8.

VI. *Of the prevention of the disease.*

We have as yet discovered no remedy, that has any effect in the cure of this most extraordinary disease; the means of prevention become, therefore, an object of the first consequence. Whatever has hitherto been done in this way is principally, if not altogether, to be referred to the local treatment of the wound, or part to which the poison has been applied. It is true, indeed, that numerous prophylactics have been proposed, and many are in general use, which are supposed, by their effects upon the constitution, to counteract or expel the poison; yet, upon fairly weighing the proofs of their efficacy, not one appears intitled to the smallest credit. None has been held in higher estimation for a great length of time than sea-bathing, though there is scarcely a case of hydrophobia published of late years in this country, that does not contain full proof of its inefficacy. The Orm-skirk medicine is in precisely the same predicament. Mercury too has had a fair trial, nor has it been more efficacious than the others. It is hardly necessary to take notice
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of the inefficacy of the *pulvis antilyssus* *, or of the Tonquin medicine †. The question may here be asked, admitting the frequent failure of these remedies, have they not sometimes prevented the disease? The answer would certainly be in the affirmative, if every person bitten by a mad dog, who did not use some means of prevention, were seized with the disease. But this is not the case; for in the human species the proportion of those bitten, who are seized with hydrophobia, is much less than of those who escape, even where no means of prevention are employed: we can, therefore, infer nothing in favour of these prophylactics, because they have been given in cases in which no hydrophobia has supervened. There can be little doubt, that if in any case the virtues of these specifics were sufficient to overcome, or counteract the poison, they would often be strong enough either to retard the appearance, or mitigate the symptoms of the disease, like to what we see from mercury in the venereal disease, or bark in intermittents; but nothing of this kind is observed, and the poison produces its

* Composed of the *lichen cinereus terrestris* & *piper nigrum*.

† Composed of musk and cinnabar.

peculiar effects equally soon and equally violent, when these prophylactics have been used, and when they have not.

The prevention of the disease therefore depending upon the local treatment of the wound, various modes have been made trial of, either with a view to procure the discharge, or insure the destruction, of the poison. Cupping-glasses have been applied to the wound, and it has been kept open by irritating applications for a great length of time. The part has been destroyed by caustics, and by the actual cautery; and it has been cut out. There is good reason to believe that all these have, at different times, been used with advantage; but the facts before the public, as well as those collected by the society, contain full evidence of the failure of every one of them, except the last mentioned, that is, cutting out the part.

In considering the local treatment, the following things appear to deserve attention: 1st, The removal of the poison by washing the part simply; 2dly, The destroying the part by caustic; and, 3dly, the cutting of it out.

It

It has been recommended * to wash the part with cold water repeatedly poured upon it, which is to be continued for some time. The practice is safe, and may possibly do good, particularly if made use of immediately after the bite. Cold water is better probably than warm, as warmth increases the sensibility, and quickens the action of all living parts, which might render the lacerated surfaces of the wound more susceptible of the effects of the poison. Though much stress cannot be laid on this mode of prevention, yet, as cases may occur where there may be insurmountable objections to more effectual steps, it may deserve a trial; and it would probably be more successful, if, after washing copiously with cold water, the caustic alkali was to be added to the water, in such proportion as the part could easily bear, and the washing to be continued with this for some time.

Caustics may be admissible in some cases, where the knife cannot be used; and though they have failed in certain instances, yet that was probably owing to their not having been applied to all the infected surfaces. Late ex-

* London Medical Journal, vol. x. p. 295.

periments * have indeed taught us, that all caustics do not counteract the effects of poisons applied to the human body. It would appear, however, that the best caustic has not been used, which is probably the caustic vegetable alkali in a solid form, the *kali purum* of the London Pharmacopœia ; both as it acts more speedily, and also more completely destroys and dissolves all animal substances. By applying it to the various surfaces of the wound, and immediately removing with a spatula the parts upon which it has acted and dissolved, it may again be applied, and the part destroyed to what depth may be deemed necessary : the surgeon seeing all the time the extent to which the caustic goes.

What has been said under the two preceding heads on washing off the poison or destroying it by caustic, must be understood to apply only to those cases where there are insurmountable objections, either from the place where the bite is, or other causes, to cutting out the part. Whenever the part can be cut out, it ought always to be done, as the only certain means hitherto employed of preventing the disease. In performing this operation

* Vid. Fontana, vol. ii. p. 5. and Appendix.

care must be taken to cut out every part with which the dog's teeth have come in contact, for the smallest portion left might produce the disease. It becomes, therefore, necessary for the operator to examine accurately the part, and to ascertain to what depth, and in what direction, the teeth have penetrated, keeping in his mind the situation of the parts in the act of biting, in which the skin and the flesh are pinched up, and therefore put out of their natural position, before the teeth penetrate them *.

The sooner the operation is performed it must be so much the safer; but there arises a question of considerable importance, that is, how long after the bite can the part be cut out, so as to prevent the disease? Nothing could determine this fully but experiments made upon the poison, an arduous undertak-

* Mr. Hunter in one case removed the parts, as he thought, freely, and there was nothing on the under surface of the piece cut out, that led him to suppose he had not cut beyond the bite. But on examining the surface of the wound, he found a part in the middle which was hollow underneath, which shewed he had not gone deep enough, but had left a ridge, as it were, over part of the passage made by the dog's teeth, and which could only have been discovered by examination after the operation. This is mentioned, to shew the care that is requisite in cutting out the part, and also the necessity of going to a proper depth.

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ing, and not without much danger ; yet not to be despaired of, if we advert to the experimental inquiries concerning poisons, which a thirst after knowledge has produced of late years. Till something of that kind is done, the question can only be answered imperfectly from a few scattered facts, and conjectures. From the facts before the society it appears, that the part has been cut out * thirty hours after the bite, and in one case as late as the fifth day.

In one of the patients, an account of whom has been communicated to the society, the bite immediately inflamed and festered, and on the fifth day an absorption took place, as appeared by the swelling of a gland in the arm-pit, which was followed by a considerable degree of fever, that lasted some days ; but none of the symptoms of hydrophobia appeared till the usual period, and after signs of a second absorption, when the disease proved fatal. From this and similar facts in the animal œconomy, it is probable that the poison lies long in the part, as in some other cases of inoculation, and would ap-

* Dr. John Hunter directed the part to be cut out, and it was done in his presence by Mr. Foote, who has published the case, but appears to have forgot the operation, for he states that the tooth perforated the part of the skin cut out, which if it had, the operation would have been of no use.

pear to be incapable of affecting the constitution, till it had produced a previous change in the part. If a conjecture might be allowed on this point, it would seem that the pains about the wound rising towards the head or body, indicated the absorption of the poison; and that the poison had been confined to the wound till a day or two before the symptoms of the disease appeared. On this supposition the part might be removed, even weeks after the bite: but we must wait for further information and experience before we can come to a positive conclusion on this head.

VII. *Of the treatment of the disease.*

After the symptoms of hydrophobia have appeared, no medicine or remedy that has hitherto been used has relieved, much less cured the disease. On this consideration it may seem unnecessary to enumerate the various things that have been tried; but, without a knowledge of what has been attempted, much time must be lost in useless trials and fruitless repetitions; and in fact, the want of preconcerted order and method in investigating the cure of this disease, is very apparent in all the writers upon the subject, and is probably

bably a principal cause that no progress has been made in that important enquiry. In stating shortly the various remedies that have been tried, opium deservedly claims the first place. Reasoning from analogy, there is no article in the materia medica that would appear so peculiarly adapted to the relief or cure of all the symptoms of hydrophobia, as opium. It has therefore, in various shapes and forms, had the most full and ample trial, and has been found to do no good; and it can only be imputed to the want of method and order abovementioned, that this medicine still continues to be given in almost every case of this disease. It is evident that, however much might have been expected originally from opium, there are at present few articles in the catalogue of medicines, that have not a better chance of curing hydrophobia.

Mercury has also had a fair trial, both with a view to prevent the disease, and likewise to remove it after it had actually taken place. But in neither case has it done any good.

Bleeding, the warm bath, also blisters and cantharides have been used, but with no better effect.

In order, therefore, to avoid a repetition of medicines, which can be productive of no good,

good, we ought to have preconcerted various new methods of treating the disease, which may be tried as circumstances may indicate. In most diseases the doctrine of the *juvantia* and *lædementia*, as it has been called, affords some direction respecting the treatment; in hydrophobia there is scarcely any thing observed to afford even a temporary relief. Among the cases collected by the society there are two, in which the relief obtained by running was very remarkable; in one the amendment was so considerable, that the patient did not look like the same person after running about a quarter of a mile. This suggests an experiment, which might be easily tried. It would probably be made to best advantage in the open air, in a quiet, retired, and shaded place. It would soon appear, whether it were better to run briskly for a short time, with frequent stops between; or to take a slower pace, that could be continued for a greater length of time. If the patient found relief, there would be no difficulty in getting him to persevere.

All the cases of the disease laid before the public contain proofs of the sufferings of the patients in attempting to swallow liquids; it is, therefore, an experiment that should not

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be wantonly, and out of mere curiosity, made upon them. At the same time it is an object of much consequence to support by nourishment and cordials a body labouring under the influence of so destructive a poison. Food, therefore, in a pulpy state, should be got down as much as possible; and if mixed with wine it would probably be the better. Bread or biscuit soaked in wine would answer this description. But if nourishment could not be got down, broths, or warm wine and water, might be administered by clyster. Some plan of this kind would be absolutely necessary, if motion was found to give considerable relief.

It has been stated, that the means of prevention consisted chiefly in the local treatment of the wound; and it may be a question how far something of the same kind might not prevent an aggravation of the symptoms, after the disease has come on. There is reason to suspect that the poison is confined to the part bitten till within a very short time of the appearance of the disease; and probably the moment the poison is conveyed into the general circulation by the absorbents, the symptoms begin. Judging from the analogy
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of some other poisons, the greater quantity that is conveyed into the blood the more violent will the effects be; good, therefore, might arise from lessening this quantity. With this view numerous and deep scarifications might be made where the wound was, and cupping-glasses applied repeatedly. Ligatures may be applied. Might not ice, or a freezing mixture be applied so as to benumb the part, and arrest for a time all motion, and of course that of the lymphatics?

There is sometimes an appearance of periodical remissions and exacerbations in the symptoms; and there is some reason to suspect that such cases are of a milder nature, and that some of them recover. Upon this ground the Peruvian bark might be tried. It might be swallowed in an electuary, and also thrown up by clyster.

In the East-Indies, in the Carnatic, there is a pill in use, said to be a specific against the poison of serpents, and also the bite of a mad dog. The principal ingredient has been ascertained to be arsenic. It may seem strange to propose as a remedy in any case, a substance that is a most deadly poison; but we know that arsenic can produce not only very
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great, but also very salutary effects upon the constitution. The most obstinate intermittents have been cured by a few drops of a solution of it. It might be tried in the same form, and in a dose somewhat increased, in hydrophobia, as it is in agues. One tenth of a grain dissolved in water is given in agues three times a day; this dose might be doubled.

It would not be difficult to enumerate various other active substances in the materia medica, which might be tried against the hydrophobia; but every one may readily chuse for himself; for our grounds of trying one in preference to another are merely hypothetical.

Nothing would probably contribute so much towards ascertaining a proper treatment of the disease, as experiments made upon the poison. It is true the undertaking would be both difficult and hazardous; yet the danger is probably greater in apprehension than it would be in reality. Dogs known to be mad are often confined till they die; and in this state there would be no great difficulty in collecting a portion of the saliva, or poison. The point of a lancet would probably introduce the infection as certainly as the tooth of the dog.

dog. By experiments upon dogs, the several stages of the disease might be known; the latest period at which the contaminated part could be cut out with success, might be ascertained; and various *counter poisons* might be applied to the wound, or administered internally. It might be determined, whether the saliva of other animals, besides those formerly mentioned, had the power of communicating the disease, while labouring under it. An experiment with the saliva of an hydrophobic patient might easily be made upon a dog. It might be ascertained whether any of the humours of the body of an infected animal possessed the poisonous quality, except the saliva. The liver of a dog that has died mad is reputed to be a specific against the poison, and as such is eaten in some parts of the world; but we cannot absolutely infer from this that it is exempt from the poison, for the digestion of the stomach destroys some poisons.

VIII. *Of the antiquity of the disease.*

In the days of Plutarch * it was a question, whether canine madness were not a new disease. The same point is discussed by Cælius Aurelianus †; but their mode of treating the question affords little satisfaction to a modern enquirer; their arguments turn upon speculative and metaphysical points, and they neglect to examine into the matter of fact, the only useful information. But though we are much farther removed from the origin of the disease, supposing it to be a new one, we are probably in a better condition to determine the question, from the ample experience that later times have furnished of new diseases. In the course of the last eight or nine centuries there have appeared many new diseases; and it is remarkable, that they are not only all infectious diseases, but are capable of being produced by infection alone, at least as far as our experience goes. Of the infectious nature of canine madness there can be no doubt, and there is reason to suspect, as

* Symposiacon, lib. viii. probl. 9.

† Acut. Morb. lib. iii. cap. 15.

has been stated above, that it is only communicated by infection; in both particulars, therefore, it agrees with what may be called the new diseases of modern times. The question simply of the novelty of a disease must be a thing of little consequence, but when that is connected with the manner in which it is propagated, it becomes a consideration of importance; and if it should appear that there is reason for believing the hydrophobia to be a new disease, it may be an additional proof of the opinion already advanced, that it is only propagated by infection.

It is said in Plutarch, that the hydrophobia was first seen at Rome in the days of *Asclepiades*; and no mention is made of the disease in Hippocrates, or in any preceding or contemporary writer. It is a distemper so singular and striking in its appearances, that it could never be seen without leaving the deepest impression upon the mind; and the silence of Hippocrates is a strong presumption that it did not exist in his time. It has been alledged that Homer was acquainted with the disease, because he uses the word *Αυσσω*; but it is evident that he means to express the anger or fury of a dog from passion,

and not from disease; though the term was very naturally afterwards applied to the disease. A similar derivation is to be observed in the French name of *rage*. Aristotle * is the first writer who expressly mentions the disease. He says that all animals besides man, were infected by the bite of a mad dog; and that it proved fatal to every animal except man. The imperfect state of his knowledge is a proof, that in his time the disease was recent. It has been remarked before, that a small proportion only of those of the human species who are bitten, are seized with the disease; and Aristotle might have seen several who received no injury from the bite of a mad dog. Again, the disease not appearing till long after the infection, and the symptoms in man differing greatly from those in the dog kind, in which there is no difficulty or aversion to swallow either liquids or solids, some time might elapse, and many cases of hydrophobia occur, before it was referred to its true source. But a period of no great length of time must have been sufficient to clear up all these doubtful points; and when we advert to the total

* De Histor. Animal. lib. viii. cap. 22.

silence of Hippocrates, the imperfect knowledge of Aristotle, and the familiar manner in which subsequent writers speak of the disease, we are tempted to conclude that canine madness did not exist in Greece till a short time before the days of Aristotle, that is, about two thousand one hundred years ago.

XVIII. *Some Observations on Ulcers.* By
 EVERARD HOME, Esq; F.R.S. *Assistant*
Surgeon to St. George's Hospital.

As the management of ulcers is one of the most common offices of surgery, the applications employed for that purpose, are almost without number. Yet the usual modes of treating such complaints, when situated on the lower extremities, have been so unsuccessful, that they are regarded, not unjustly, as the opprobrium of the art.

Ulcers generally considered, vary in many respects, according to the constitution of the patient, and the parts on which they are situated; the modes of treating them can, therefore, be collected only from a field of practice of considerable extent, and form a topic of enquiry, much too various and important, for the limits of this paper. It is not my intention at present to enter minutely into the subject; a few observations on the treatment of such sores as are of no specific nature, but from weakness, indolence, or long habit, have no disposition to skin, will be all that I shall now bring forward.

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The usual mode of treating ulcers of this kind is by stimulating, or by sedative applications; when neither of these are thought necessary, dry lint is commonly applied to the surface of the sore, to absorb the matter, and some unctuous covering is laid over it, to prevent evaporation, and more readily admit of the removal of the dressings.

Stimulating medicines are commonly mixed up with some of the expressed oils, and applied in the form of an ointment; but those applications that are intended to act as sedatives, are usually combined with water, and made use of in the form of fomentations and poultices.

Both these modes of applying medicines to an ulcer, experience has proved to be improper as a general practice. Unctuous dressings are found not unfrequently to disagree with the surrounding skin, and, when brought in contact with the surface of an ulcer, become extremely irritating. Watery dressings, from the weight which is necessary for their constant application, are in many instances both inconvenient and hurtful; and, when long continued, give the granulations a disposition to be luxuriant and flabby.

From

From the knowledge of these facts, which are I believe sufficiently established, surgeons have, for some years past, applied their minds to strike out some improvement; and various substances in the form of powder have been proposed, as substitutes for the common dressings.

In the course of these last fourteen years, I have had frequent opportunities of attending to cases of this kind, and have made use of a variety of substances, in different forms, as external applications. I have not only tried those powders recommended by others, but have used some which had not before been thought of. Of the latter kind, a few appear to me to deserve particular attention; my experiments and observations upon which, I have thrown together in this paper.

As the application of powders to ulcers in general is a practice not yet much known, it may not be improper first to mention the result of my experiments on such substances as have not been found to answer, that others may not lose time in useless trials.

Tartar emetic, in the form of powder, has been recommended, and I have used it in a variety of instances; in some it produced no
visible

visible effects, and in others such as evidently were unfavourable; nor in any case could I effect a cure, by persisting in the use of it.

Chalk has had its advocates, but experience does not authorise me to give my testimony in its favour; it may answer in superficial sores, where nothing in fact is necessary to be done. This powder, when first applied, does not seem to produce the smallest irritation; but if it be long continued, the sore in general, although not always, becomes foul.

Plaster of paris is an application I was led to make use of several years ago, from an idea that it would absorb the matter of a superficial sore as fast as it was secreted, and form a crust, which, similar to a scab, would induce the parts underneath to skin over; experience, however, proves that this is not the case, and the edges of the sore, in many instances, are much irritated by this application.

Lapis caliminaris, in the form of powder, has had a character with several surgeons for having the power of disposing superficial sores to skin over; I therefore thought it deserving of a trial. I used it in a great many in-

stances, and no one circumstance has occurred from which I could conclude in favour of its efficacy.

That each of these four substances has been found, in particular instances, to succeed, I am very ready to believe; but, as far as my own observations lead me, I am inclined to think that they are not to be set down as applications on which dependence can be placed in the cure of ulcers.

The use of these mineral substances in powder having proved unsuccessful, I was led to consider how far the vegetable medicines could be applied in that form with advantage; and I was encouraged in this enquiry from having, in many instances, experienced the good effects of the carrot and cassada poultices *, which are nothing more than the powder of those roots in a moist state.

During the last war, I was eight months in the island of St. Lucia, in the West-Indies, where ulcers on the the legs of the worst kind were exceedingly numerous; and the application from which they appeared to derive the greatest benefit, was the cassada-root grated into a powder, and moistened with

* The cassada is the *Satropa manihot* of Linnæus.

water. It did not at that time occur to me, that it might be used in a dry state.

As rhubarb has considerable powers in stimulating the villous internal surface of the stomach and intestines, which in appearance is not very dissimilar to that of a granulating sore, I made choice of this powder as an external application.

I began my experiments by covering the surfaces of several ulcers with the powder of rhubarb, very thinly spread over them, and afterwards dressing them with a pledget of common ointment. These applications were renewed once in twenty-four hours. Under this treatment the sores mended for several days, and then seemed to be at a stand, although they retained a healing appearance. This circumstance was not readily accounted for, but as the pledget was exceedingly greasy, and came in contact with the edges, and many other parts of the sore, it was attributed to that cause, and a piece of lint was therefore interposed between the powder and the unctuous covering, after which the granulations became disposed to form skin, and the sores were gradually healed.

Encouraged

Encouraged by these trials, I made use of this powder under a variety of circumstances, with a similar result. In some cases it appeared, after being continued some time, to lose its effect upon the ulcer. But even in these instances, the applying it twice in the same day was sufficient to restore the first effect. In other cases the rhubarb seemed to be too violent an application, in some degree disposing the granulations to ulcerate; this effect was however prevented, by adding to it the powder of opium, in the proportion of a drachm to an ounce. By these means the application of this medicine may be adapted to the degree of indolence or irritability in the sore to which it is applied.

Having ascertained the effects of what is commonly called Indian rhubarb, I made comparative trials with that imported from Turkey, but could not discover any difference that appeared material. Rhubarb in the form of * tincture did not by any means produce similar effects; on the contrary, the sores to which it was applied, when irritable in their

* The tincture used in these experiments, was made by pouring proof spirits upon the powder of rhubarb, and, after letting it remain three or four days without adding any other ingredient, the tincture was separated for use.

nature, put on a foul appearance; when indolent they were less affected, but did not acquire the same healing disposition that the powder usually produced.

After confining my experiments to rhubarb, and having this success, I was naturally led to try the effects of other vegetable powders. It seemed necessary to determine whether this healing property was peculiar to rhubarb, or, if it be in other vegetable substances, in which of these it existed in most perfection.

With this view I selected the following powders, as proper subjects for my experiments, and shall state, in as few words as possible, the result of my observations upon them.

Ipecacuanha appeared to irritate the granulations to which it was applied, giving the fore a foul appearance *.

The flour of mustard, applied by itself, not only irritated the granulations, but excoriated the surrounding skin; to prevent these effects, it was mixed with the farina of lintseed meal in different proportions. Thus

* Equal parts of ipecacuanha and rhubarb make an useful mild escharotic for destroying warts.

weakened I applied it to several sores, but did not find its general effects sufficiently favourable to induce me to continue this application.

The gentian and chamomile were used separately, in a variety of cases. The sores under this treatment went on tolerably well, and the granulations put on a florid and healing appearance; but the process of forming new skin was extremely slow, when compared with the effects of rhubarb. Comparative trials of these powders with rhubarb on the same sore, afforded sufficient evidence of the inferiority of their powers in disposing ulcers to heal.

The powder of the columba-root appears, from its effects, to bear a greater resemblance to the rhubarb than any of the other substances which were made trial of. In several cases where the sores had become stationary under the application of the rhubarb, changing it for the columba produced a disposition to heal, which continued till the sores got well. This certainly is in favour of the columba, but is no proof of its superiority, since all medicines lose their effects from being long continued, and, when that happens, simply
I
leaving

leaving them off may produce a cure, or dispose the parts to get well under applications which before had failed.

My experience of the effects of this medicine being less extensive than of those of rhubarb, I am unwilling to say more respecting it; but in using columba, the granulations sometimes rise above the surface, a circumstance which does not occur when the rhubarb is used.

It will hardly be necessary to mention here the difficulties which must occur to every medical practitioner, in ascertaining the effects of a medicine; the only satisfactory mode of doing which, is to compare a number of results, obtained under different circumstances, deducing our conclusions from the aggregate.

In determining the effects of local applications, the surgeon is often misled by some circumstances which are not, I believe, sufficiently attended to; these, therefore, I shall briefly mention.

It should be observed, in the first place, that almost all sores appear for a time to receive benefit simply from a change in the dressing, although the new application be by no means better than the former. In the

second, that all local applications lose their effects upon a fore, whatever they may be, after long continuance.

The circumstances of the patient are also to be taken into the account, before we can well ascertain the effects of our treatment. A man who has been suffering all the distresses of poverty, when taken into an hospital, where he is kept quiet, and well taken care of, will mend under any treatment; and in many instances would get well without the assistance of medicine. In all ulcers, on the lower extremities particularly, rest alone is of the utmost benefit. To these and similar circumstances, attention must be strictly paid, with due allowance for their natural effects, in all experiments that are attempted on this subject.

Having given a general view of the effects of rhubarb as an application to ulcers, and compared them with those of other vegetable and mineral powders; I shall add only a few observations upon the particular changes which most commonly occur in sores while under this treatment.

In mentioning rhubarb as a dressing, it is not meant to bring it forward as one that will

in every case succeed ; but only to introduce it into practice, as a mode of treatment superior to some now in use : as one which will be found not unfrequently to give the granulations a healing disposition, and, when they have arrived at the external surface, dispose them to form skin.

In the course of the last twelve months I have used this dressing almost constantly in St. George's Hospital, in a large infirmary, where ulcers in the legs are very numerous, and in private practice. From the different cases which have occurred in these situations, I have been led to make the following remarks upon the effects of this medicine.

When the rhubarb is first applied, the sore is commonly more painful than it was before, and the whole surface becomes of an uniform red colour. In foul ulcers, where the matter is principally composed of coagulable lymph, adhering to the surface, a change is produced in the discharge ; it becomes more like true pus, which separates from the surface, and exposes the granulations to our view.

In sores where the granulations are large, spongy, and semitransparent, under this treat-

ment they become small, firm, very pointed at the surface, and of a florid colour; they are also sensible to the touch, making the fore extremely tender.

The granulations, as soon as they have risen to the level of the skin, seem to have a stop put to their growth; and those that are next to the surrounding cutis lose their irregular pointed appearance, become smooth, shining, and of a more florid colour than the rest of the fore. In this way a margin is formed, about one-eighth of an inch broad, which is afterwards covered by a cuticle, contracting the size of the fore; and this process goes on till the whole is skinned over.

This circumstance of the granulations becoming stationary when arrived at the level of the skin, is so general an effect, that in an hundred cases, many of these sores nearly equal to six inches square, no one instance to the contrary has occurred.

When the sore is beginning to heal, or has in part skinned over, the powder adheres firmly to the edges, and sometimes to the surface of the granulations, forming a crust over these parts. This should be carefully removed at each dressing, as it confines the matter,
which

which is often productive of mischief, and always retards the progress of the cure.

From these facts, which have been ascertained by experiments too frequently repeated to admit of much fallacy, I venture to recommend the rhubarb as an application, which will be found useful in the treatment of ulcers; leaving it to a further and more complete experience to determine the exact place it is to hold among the applications now in use.

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